THE DEVELOPMENT OF CHILDREN ADOPTED FOLLOWING A SOCIAL-EMOTIONAL INTERVENTION IN AN INSTITUTION

by

Megan M. Julian

B.A. in Psychology, Butler University, 2007

M.S. in Clinical and Developmental Psychology, University of Pittsburgh, 2010

Submitted to the Graduate Faculty of

The Kenneth P. Dietrich School of Arts and Sciences in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy in Clinical and Developmental Psychology

University of Pittsburgh

2015

UNIVERSITY OF PITTSBURGH

KENNETH P. DIETRICH SCHOOL OF ARTS AND SCIENCES

This dissertation was presented

by

Megan M. Julian

It was defended on

February 23, 2015

and approved by

Susan B. Campbell, Ph.D., Professor, Department of Psychology

Christina J. Groark, Ph.D., Associate Professor, School of Education, Office of Child Development

Thomas Olino, Ph.D., Assistant Professor, Department of Psychology, Temple University

Daniel S. Shaw, Ph.D., Professor and Department Chair, Department of Psychology

Dissertation Advisor: Robert B. McCall, Ph.D., Professor, Department of Psychology

THE DEVELOPMENT OF CHILDREN ADOPTED FOLLOWING A SOCIAL-EMOTIONAL INTERVENTION IN AN INSTITUTION

Megan M. Julian, Ph.D.

University of Pittsburgh, 2015

Worldwide, over 2 million children reside in institutional care; while family care is ideal, institutions will continue to exist for many years, and it is important to investigate ways to improve the care of children who reside in institutions. The current study is a post-adoption follow-up of an intervention in St. Petersburg, Russian Federation Baby Homes (BHs) wherein children received enhanced social-emotional care by regular BH caregivers. Children in this study previously resided in a St. Petersburg BH and received either No Intervention (CNoI), Training Only (TO), or Training and Structural Changes (T+SC). While children were in the institution, there were clear differences between groups in their physical, behavioral, and social-emotional development with T+SC faring the best, TO intermediate, and NoI having the poorest outcomes (St. Petersburg-USA Orphanage Research Team, 2008). This dissertation aimed to determine whether benefits of the intervention persisted up to 8 years after adoption. Parents completed measures including the 23-item Attachment Questionnaire, Indiscriminately Friendly Behavior Measure, BRIEF-P, CBQ (selected subtests), ITSEA, and CBCL 1½-5. Hierarchical regression analyses were conducted to examine the effect of Age at Adoption, Years in Adoptive Home, Intervention Group, and Age at Adoption x Intervention Group interactions on each outcome measure. Overall, while there are some residual effects of the intervention on children after adoption, graduates of each intervention group are functioning very well in early childhood. Graduates of intervention BHs tend to have better attachment security, lower levels of

indiscriminately friendly behavior (T+SC only), fewer behavior problems (T+SC only), and lower levels of Internalizing problems (TO only) and Dysregulation (TO only) than CNoI. An older age at adoption or more time in the adoptive home were associated poorer outcomes in some domains. Children who had more exposure to intervention conditions (e.g., T+SC and TO adopted at older ages) had better attachment security (T+SC) fewer externalizing (TO only) and internalizing (TO only) problems, but poorer executive function and lower competence. Because all groups were, on average, functioning within the normal range of behavior, "poorer" outcomes are hypothesized to reflect the increased agency, creativity, and emotional expression of children from intervention BHs.

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Worldwide, it is estimated that over 2 million children reside in institutional care, and over 800,000 of these children are in Central and Eastern Europe and the Commonwealth of Independent States (UNICEF, 2009). While children generally demonstrate better developmental outcomes in family care than in institutions (Julian & McCall, 2011; Nelson et al., 2007; Smyke et al., 2012), it is unlikely that institutions will be completely eliminated in the near future in many countries. There will continue to be large numbers of orphaned children due to natural disasters, wars, HIV, and unplanned pregnancy. Further, many countries have limited resources to devote to supporting family care, and there are few foster and adoptive parents due to historical, cultural, and religious objections to adoption or foster care. Thus, while family care is ideal, institutions will continue to exist for many years, and it is important to investigate ways to improve the care of children who reside in institutions.

1.1 DEVELOPMENT OF CHILDREN ADOPTED FROM INSTITUTIONS

Children who are adopted from institutions typically spend their first months or years of life residing in group care where they receive little individualized attention and few opportunities to form relationships with their caregivers. During these young ages, caregiver-child relationships are of utmost importance because they serve as the context within which young children learn about themselves and their world. Typically, caregivers serve as a child's attachment figure, and

they scaffold a child's physical, cognitive, and social development by shaping children's experiences and the amount of assistance they provide. Institutional environments generally fail to provide young children with these experiences, and a great deal of research has evaluated how children fare after they are adopted from institutional care.

Post-institutionalized (PI) adopted children generally have higher rates of certain problems than parent-reared children (Gunnar, van Dulmen, & The International Adoption Project Team, 2007; Juffer et al., 2011; MacLean, 2003). Specifically, PI children tend to have higher rates of behavior problems (total, internalizing, and externalizing; Juffer & van IJzendoorn, 2005); attention, executive function, and emotion regulation problems (Bos, Fox, Zeanah, & Nelson, 2009; Colvert, Rutter, Kreppner, et al., 2008; Merz & McCall, 2011; Rutter et al., 2010; Tottenham et al., 2010); attachment difficulties with their adoptive parents (Chisholm, 1998; Marcovitch et al., 1997; O'Connor et al., 2003); disinhibited social behavior (Bruce, Tarullo, & Gunnar, 2009; Chisholm, 1998; O'Connor, Rutter, & The English and Romanian Adoptees Study Team, 2000); and stunted physical development (Johnson & Gunnar, 2011; Johnson et al., 1992; Rutter & The English and Romanian Adoptees Study Team, 1998). However, despite their early adversity, once they are adopted into supportive families, PI children often experience substantial catch-up growth and show remarkable resilience—the majority of PI adopted children fall within the normal range of adjustment. While gender differences are rarely assessed in this population, a meta-analysis detected no gender differences in behavior problems (Juffer & van IJzendoorn, 2005).

The severity of deprivation while children reside in an institution relates strongly to the extent to which early institutionalization predicts later development. The vast majority of institutions provide insufficient social-emotional care for resident children, so secure attachment

relationships are exceptionally rare in this envirnment. Children may spend large portions of their day isolated in cribs or play pens with little access to toys or other children, limiting their opportunity to progress developmentally. While some institutions (e.g., psychosocially depriving institutions) provide adequate medical care, nutrition, and sanitation, and are free from abuse, other institutions (e.g., globally depriving institutions) provide insufficient care in these respects as well. There is a clear trend in the literature for children adopted from qualitatively better Chinese and Korean orphanages to have fewer negative long-term effects including fewer behavior problems and social problems and less inattention/overactivity (e.g., Dalen, 2001; Tan, Marfo, & Dedrick, 2007, 2010). In contrast, children from globally depriving 1990s Romanian institutions were found to have more significant and lasting negative effects including stunted physical growth, autistic-like features, and stereotyped behaviors along with more behavior problems, social problems, and inattention/overactivity (Rutter et al., 2010). When children from psychosocially-depriving Russian institutions were compared to children from globally-depriving 1990s Romanian institutions in one study, the latter group demonstrated higher rates of behavior problems (Merz & McCall, 2010). When institutions are improved (The St. Petersburg-USA Orphanage Research Team, 2008) or when children are moved from institutions to better quality foster care (Smyke, Zeanah, Fox, Nelson, & Guthrie, 2010), developmental and behavioral outcomes improve as well.

Further, the timing of a child's exposure to institutional care appears to be associated with their risk for problems later on. The first months and years of life are a time of rapid development, so deprivation during this time can be particularly harmful. Generally, a later age at adoption, and thus more exposure to a depriving environment, is associated with a higher rate of problems in many domains including attachment, disinhibited social behavior (or

indiscriminate friendliness), quasi-autistic behavior patterns, poor peer relationships and more social problems, behavior problems, and attention problems (Julian, 2013). In some studies, a step-like relation between age at adoption and rates of problems emerges such that children adopted before a certain cut-off age are similar to parent-reared children in the rate of later problems they display, but children adopted after that point have elevated rates of problems. The specific age at which this "step" occurs appears to relate to the severity of deprivation in the institution, with an increased rate of problems occurring as early as 6 months of age at adoption for children adopted from globally depriving 1990s Romanian institutions (Beckett et al., 2002; Colvert, Rutter, Beckett, et al., 2008; Kreppner et al., 2007; Stevens et al., 2008), and around 18 months of age at adoption for children adopted from socially-emotionally depriving Russian institutions (Hawk & McCall, 2011; Merz & McCall, 2010, 2011; see Julian, 2013 for a review).

The age at which a PI child is assessed also plays a role. In both cross-sectional and longitudinal studies, PI children begin to diverge from parent-reared children in their rates of behavior problems between middle childhood and adolescence (Colvert, Rutter, Beckett, et al., 2008; Gunnar et al., 2007; Verhulst & Versluis-Den Bieman, 1995). Problems are less likely to be detected in this population when children are assessed in early childhood. This tendency for problems to emerge only years after the period of institutionalization is often thought of as a "sleeper effect," but it is still unclear to what extent this applies to various outcome measures and to children from more or less severely depriving institutions.

1.2 EARLY EXPERIENCE

While some (e.g., Clarke & Clarke, 1976) suggest that there are few lasting effects of early experience on children's later development, others (e.g., Sroufe, Egeland, & Kreutzer, 1990) maintain that the early years play a prominent and lasting role in children's later development. In fact, one study demonstrated that early maternal sensitivity continues to have lasting associations with social competence and academic skills through adolescence, even after accounting for transactional processes (Fraley, Roisman, & Haltigan, 2013).

Children who spent part of their early life residing in an institution and then were adopted into supportive families have time-limited social-emotional deprivation, allowing for more precise examination of the lasting effects of early experience. The developmental programming hypothesis is the most prominent approach to attempt to explain how early experience contributes to later developmental outcomes. This hypothesis suggests that during sensitive periods (e.g., when somatic and neurological structures are being built), the effects of experience are "programmed" into the brain (Rutter, O'Connor, & The English and Romanian Adoptees Study Team, 2004). Thus, experience during sensitive periods is crucial, and later experience is likely to have a more limited effect on outcomes. The first months and years of life are widely known to be a time of rapid neurological and behavioral development, so it is perhaps not surprising that deprivation within this time period is associated with such lasting effects. The developmental programming hypothesis generally fits well with the findings of studies of PI children. Despite the limited duration of their deprivation and their high quality care after adoption, PI children still have higher rates of problems than parent-reared children years after they have been adopted into supportive families.

The lasting effects of experience in the first two years of life suggest that this period of time may constitute a sort of sensitive period. Furthermore, because the first two years of life are associated with rapid biological and behavioral development, it makes sense that experience during these ages would have a lasting influence on a child's course of development. While the existence of a sensitive period in itself does not imply a particular causal mechanism, the step-like relation between age at adoption and various outcomes may imply some kind of intra-organismic change (Kreppner et al., 2007). There is insufficient evidence to be certain about the changes that mark the end of a potential sensitive period, but epigenetic effects are likely to be partially responsible. Early and chronic elevated stress levels are linked to epigenetic changes (Shonkoff, Boyce, & McEwen, 2009) that, in animal studies, are associated with prolonged stress responses, changes in brain architecture and chemistry, and behaviors resembling depression and anxiety (National Scientific Council on the Developing Child, 2010). If a similar model exists for humans, a certain amount of deprivation related to both its severity and duration (i.e., cumulative adversity) might be required before epigenetic changes take place (e.g., 6 months in globally depriving institutions and 18 months in socially-emotionally depriving institutions).

While early deprivation through institutional care certainly increases the risk that PI children will experience problems later, only some of the children, even from the most depriving institutions, demonstrate negative outcomes. While little research has examined what specifically contributes to which children are more versus less susceptible to the negative effects of early institutional adversity, it is likely that both group and individual differences in quality of care (Smyke et al., 2007) and individual genetic differences play a role (Van IJzendoorn et al., 2011).

1.3 WHAT IS IT ABOUT THE INSTITUTION?

It is widely accepted that institutionalization is associated with higher risk for poor developmental outcomes, but less is known regarding specifically which characteristics of the institutional experience produce such negative effects on development, and it is likely that multiple factors play a role. One possible explanation is that a basic lack of stimulation might contribute to children's developmental delays and poor later outcomes. It is not uncommon for institutionalized children to be left alone in cribs or play pens for hours on end with minimal interaction with toys, peers, or caregivers. Without frequent everyday opportunities to interact with their environment, institutionalized children are bound to have delays in their development. Furthermore, because caregivers in institutions are often primarily concerned with providing for each child's basic needs, institutionalized children typically do not have a caregiver available to provide appropriate scaffolding to their experiences (e.g., providing just enough support to help an unsteady child stand or walk), which can limit a child's ability to progress.

Beyond a simple lack of stimulation, at the core of the institutional experience is a distinct lack of early caregiver-child relationships. Even in institutions where medical, nutrition, and safety needs are met, there tend to be many and changing caregivers who provide care in a perfunctory way. Caregiver-child relationships rarely develop, in part because children typically do not see the same caregivers from day to day, and in part because caregivers may believe that forming a relationship that will later be broken (e.g., when a child is adopted or moved to another institution) will be harmful to the child's development (The St. Petersburg-USA Orphanage Research Team, 2005). Caregiver-child relationships are known to be fundamental to a young child's development; children seek comfort and emotional support from caregivers, and also

learn contingencies, social cues, and social agency from stimulation and interactions with a sensitive and responsive caregiver (Sroufe & Waters, 1977). Caregivers play a major role in scaffolding children's cognitive, social, behavioral, and physical development. The lack of experience with social relationships in early life is also likely to contribute to the lack of social inhibition and awareness that characterizes many PI children. Further, the many and changing caregivers that institutionalized children experience, exacerbated by frequent "graduations" to new peers and caregivers, produce a remarkably unpredictable early environment. When children live in an unpredictable environment in the first years of life, they are at higher risk of demonstrating delinquent and aggressive behavior in early adulthood (Simpson, Griskevicius, Kuo, Sung, & Collins, 2012).

Attachment theory posits that the quality of early caregiver-child relationships (specifically sensitive and responsive care from a consistent caregiver) relates to the way that a child goes on to represent caregivers and themselves (Bowlby, 1951). Importantly, Bowlby posited that early working models are preverbal, and thus may persist even in light of more sophisticated verbal understandings (Bowlby, 1973, 1980). When children develop a secure attachment relationship, they tend to behave warily around strangers, and use their attachment figure as a source of comfort and a secure base from which to explore. Institutions tend not to provide an environment conducive to the development of attachment relationships (Zeanah, 2000); institutionalized children experience frequent changes in caregivers, and typically do not receive care that is sensitive or contingently responsive to their needs. Thus, institutionalized children are likely to develop a maladaptive internal working model of relationships. Children who experienced early institutional care may represent caregivers as undependable and unable to meet their needs, and may represent themselves as unworthy of sensitive care. Deficient early

relationship experience and insecure attachment are associated with increased problems in social, emotional, cognitive, and physical development (Blizzard, 1990; Bornstein & Tamis-LeMonda, 1989; E. A. Carlson, 1998; Landry, Smith, & Swank, 2006; NICHD Early Chid Care Research Network, 2001).

The lack of stimulation, deficient caregiver-child relationships, and unpredictability of institutional life contribute to these environments being experienced as highly stressful to resident children. For securely attached children, the presence of an attachment figure plays a role in modulating a child's physiological and behavioral responses to stressors (Gunnar & Quevedo, 2007). But, children with disorganized attachment relationships, like many who are reared in an institution, are less able to regulate their stress responses, and correspondingly are more likely to have disturbances in their hypothalamic-pituitary-adrenal (HPA) axis activity and later behavioral and emotional problems (Gunnar & Quevedo, 2007; Hertsgaard, Gunnar, Erickson, & Nachmias, 1995; Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). In fact, children who have spent part of their early life residing in institutions have abnormal cortisol patterns while residing in an institution (M. Carlson & Earls, 1997), within a month after adoption (Gunnar, 2000), and years after adoption (Gunnar, Morison, Chisholm, & Schuder, 2001).

While institutions have traditionally been characterized as developmentally unsupportive, it is possible to change the behavioral culture to change children's developmental outcomes. If it is true that specific characteristics of institutions (e.g., many and changing caregivers providing insensitive and unresponsive care) contribute to the lasting effects of institutionalization, it follows that improving early relationships within an institutional environment would likely have positive effects on the development of institutionalized and PI children.

1.4 INTERVENTIONS IN ORPHANAGE INSTITUTIONS

A number of attempts have been made to improve the institutional environment to improve resident children's development. Early studies provided simple sensory stimulation that was not contingent on an infant's behavior. These interventions tended to prevent decline or produce small gains in behavioral development that quickly dissipated after the interventions terminated (Brossard & Decarie, 1971; Casler, 1965; Hakimi-Manesh, Mojdehi, & Tashakkori, 1984; Kim, Shin, & White-Traut, 2003; Sayegh & Dennis, 1965; see review in Rosas & McCall, 2011).

1.4.1 Short-term interventions

Several studies have evaluated short-term interventions that focused on enhancing caregiver-child interactions. These interventions included adding daily caregiver-child play sessions (Taneja et al., 2002; Taneja, Beri, & Puliyel, 2004), a researcher becoming a short-term primary caregiver (Rheingold, 1956), impoverished elderly people being employed as "foster grandparents" to specific children (Saltz, 1973), and creating a "pilot unit" within an institution in which caregiver-child ratios were improved and children experienced fewer changes in caregivers (Smyke, Dumitrescu, & Zeanah, 2002). These interventions produced improvements in cognitive, motor, and social development and/or prevented decline in cognitive development and disturbed attachment behaviors, but they utilized special staff (e.g., not regular caregivers) and were mostly short-term in nature (Rosas & McCall, 2011). A recent review suggests that effects were most pronounced for children who experienced the interventions between 6 and 18 months of age (Rosas & McCall, 2011), the same ages when attachment to a primary caregiver tends to develop.

1.4.2 Comprehensive interventions

While the above interventions were all time-limited in nature, interventions in Africa (Wolff, Dawit, & Zere, 1995; Wolff & Fesseha, 1999; Wolff, Tesfai, Egasso, & Aradomt, 1995), the USA (Skeels & Dye, 1944), Central America (McCall et al., 2010), and Eastern Europe (Nelson et al., 2007; Zeanah et al., 2003) have attempted to produce permanent changes in staff behavior and the structural and institutional environment. These interventions have involved reducing the number of different caregivers interacting with each child, and training caregivers to interact with children in developmentally supportive ways. While two interventions utilized regular caregivers in institutions (McCall et al., 2010; Wolff, Dawit, et al., 1995; Wolff & Fesseha, 1999; Wolff, Tesfai, et al., 1995), one relied on teenage girls with intellectual disabilities who lived in an institution (Skeels & Dye, 1944), and another randomly assigned children to care as usual in an institution or a high quality foster care program that was designed by the investigators (Nelson et al., 2007; Zeanah et al., 2003).

One to five years after these interventions began, the behavioral environment on the wards had significantly improved (McCall et al., 2010), and children showed improvements in behavioral symptoms (e.g., sleep disturbances, social disturbances when interacting with adults and peers, self-isolation, eating disorders; Wolff, Dawit, et al., 1995; Wolff & Fesseha, 1999; Wolff, Tesfai, et al., 1995), DQ (McCall et al., 2010; Nelson et al., 2007), and IQ (Nelson et al., 2007; Skeels & Dye, 1944). Remarkably, children in one study (Skeels & Dye, 1944) were followed up 25 years later and those who had received one-to-one care from teenage girls with intellectual disabilities were found to have attained substantially higher educational levels and

were more likely to be married and self-supporting than those who received care as usual (Skeels, 1966).

1.4.3 St. Petersburg-USA Project

The St. Petersburg-USA project, which is the focus of the current study, implemented Training and Structural Changes (T+SC) in one Baby Home and Training Only (TO) in a second Baby Home in St. Petersburg, Russian Federation (The St. Petersburg-USA Orphanage Research Team, 2008). A third Baby Home served as the No Intervention (NoI) control and received care as usual. Training encouraged warm, sensitive, contingently responsive care during everyday caregiving tasks and play periods. Structural Changes included assigning primary and secondary caregivers to groups, reducing group sizes, integrating wards by age and disability status, eliminating graduations to new groups, and instituting "family hour" twice daily in which visitors to the wards were not allowed.

The intervention produced the expected effects of increased caregiver knowledge of child development and improved caregiver behavior on wards throughout the first four years after the T+SC intervention was initially implemented. Overall, children's development followed the expected pattern as well: T+SC children showed the most pronounced improvements, TO children were intermediate, and NoI children showed the most modest improvements in physical, behavioral, and social development. In fact, the longer T+SC children were in the intervention, the more improvement they showed.

Notably, although the intervention did not change children's nutrition or medical care, children's physical growth and functioning nevertheless improved. Furthermore, typically-

developing T+SC children showed impressive DQ gains, increasing from an average of 57 at baseline to 92 after 9+ months of exposure to the fully-implemented intervention. The intervention effect size produced by the St. Petersburg-USA study (d = 1.05 for non-disabled children) is comparable to the effect of adoption (d = 1.17) on cognitive development (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2008). Improvements were most evident on the Personal-Social subscale of the Battelle Developmental Inventory, given the social-emotional focus of the intervention, but children also showed significant improvements in the Motor, Communication, and Cognition subscales and in their overall Developmental Quotients.

During caregiver-child free play sessions, higher quality of play, and better alertness and self-regulation were evident in T+SC and TO children relative to NoI children, and T+SC children had more positive affect, social initiative, and communication than TO and NoI children. For attachment behavior, T+SC children aged 11.5-18 months were significantly more likely to be categorized as Insecure-Resistant (C) and Securely Attached (B) and less likely to be categorized as Disorganized/Disoriented (D) relative to TO and NoI children. Thus, this intervention was more comprehensive, intensive, and focused specifically on caregiver-child interactions than most other orphanage-based interventions, and it produced among the largest and most comprehensive set of developmental improvements of any kind of intervention in the literature. The improvements in the institutional environment and in children's development at departure from these institutions were maintained for at least 6 years after the intervention project ended (McCall et al., 2013).

1.5 LASTING INTERVENTION EFFECTS?

Thus, a wide range of interventions in institutions are known to produce improvements in children's development. In fact a meta-analysis demonstrated that each intervention that was examined produced a positive effect on cognitive development, ranging from $d = 0.36$ to $d = 1.23$ (Bakermans-Kranenburg et al., 2008). However, the vast majority of orphanage intervention studies have assessed children only while they still are participating in the intervention. Skeels (1966) reported on children decades after an intervention, but because that intervention relied on institutionalized teenage girls with intellectual disabilities, it is not particularly generalizable to other interventions. It is yet unknown whether the effects of a relationship-enhancing intervention within an institution, using regular staff, can produce effects that persist after a child is adopted into a supportive family.

Early experience, and specifically early maternal sensitivity, has been shown to have effects that persist at least through adolescence; while ongoing transactional processes play a role, early maternal sensitivity has enduring effects that go beyond such processes (Fraley et al., 2013; Roisman & Fraley, 2013). Thus, it is likely that an intervention that increases caregiver sensitivity in an orphanage context would similarly have enduring effects. Several intervention programs for never-institutionalized parent-reared children have targeted maternal sensitivity with the goal of improving children's attachment relationships. Reviews have concluded that these interventions, on average, do improve children's attachments, but maternal sensitivity is more easily changed than a child's attachment security (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; Egeland, Weinfield, Bosquet, & Cheng, 2000; Van IJzendoorn, Juffer, & Duyvesteyn, 1995). Evidence is sparse for whether these interventions produce effects that last

years after the intervention. Among four studies that aimed to increase maternal responsiveness in the first year of life and compared intervention to non-intervention children years later, one study found higher rates of secure attachment at age 3 (Van den Boom, 1995), and the remainder found lasting effects on various outcome measures (e.g., internalizing problems, externalizing problems, ego-resiliency, ego-control) for only some subgroups (e.g., girls, those with higher stress levels, those in families with both biological and adopted children; Kersten-Alvarez, Hosman, Riksen-Walraven, van Doesum, & Hoefnagels, 2010; Riksen-Walraven & van Aken, 1997; Stams, Juffer, van IJzendoorn, & Hoksbergen, 2001). Thus, while this category of interventions tends to have positive effects, it is possible that only some children will show lasting benefits.

Other kinds of early childhood interventions also have mixed evidence of long-term intervention effects. Some studies of home visiting programs find that 15 years later, home-visited mothers have fewer subsequent pregnancies and lower rates of child abuse and neglect and criminal behavior than non home-visited mothers (Olds et al., 1997), and their adolescent children have lower rates of crime, behavior problems, and substance use (Olds et al., 1998). But, other studies find a great deal of attenuation of intervention effects in many outcome domains for home-visited low-birth-weight infants by the time they reach 8 years old (McCarton et al., 1997).

Longer-term effects of early educational interventions are similarly mixed. Some studies of early educational interventions (e.g., Perry Preschool, Carolina Abecedarian Project, Chicago Child-Parent Center Program) showed that while much of the intervention-related IQ gain faded by middle childhood, many other positive effects (e.g., higher high school graduation rates, lower crime rates, higher education and earnings, etc.) persisted at least into early adulthood

(Barnett, 2011; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Reynolds, Temple, Robertson, & Mann, 2001; Schweinhart et al., 2005). Some have found that while effects of preschool are detectable at every age tested, sleeper effects may be present such that effects at an earlier age (e.g., 1st grade spring) are smaller than effects at a later age (e.g., 3rd grade spring; Magnuson, Ruhm, & Waldfogel, 2007). Head Start and Early Head Start, on the other hand, show cognitive and social-emotional benefits immediately following the intervention, but effects are small and disappear shortly after school entry (Barnett, 2011; U.S. Department of Health and Human Services, 2002, 2010). Interestingly, one of the more plausible explanations for the apparent fading of such intervention effects is that "fade-out" is more accurately described as "catch-up" of non-intervention children (Barnett, 2011). The effect sizes of early educational interventions can be small several years after the intervention ended, so non-intervention children are able to catch up to the level of intervention children, particularly if they enter relatively high quality school environments (Magnuson et al., 2007). In contexts where intervention and non-intervention children go on to relatively poor quality settings, non-intervention children are not able to catch up to the same extent, and intervention effects are more likely to be detected (Barnett, 2011; Magnuson et al., 2007).

Thus, factors like catch-up growth and sleeper effects may diminish the chances of early childhood interventions showing effects several years later. In fact, these are both commonly reported phenomena in the literature on children adopted following institutional care. The change in rearing environments from institution to family is associated with massive catch-up growth in the initial months and years after adoption, in large part due to the high-quality rearing environment that is provided by typical adoptive families. Generally, PI children tend to catch up to their parent-reared peers in physical growth and cognitive development within the first two to

three years after adoption, or by age four (Bakermans-Kranenburg et al., 2011; Rutter & The English and Romanian Adoptees Study Team, 1998; Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 2007; Van IJzendoorn & Juffer, 2006). However, children adopted after 6-12 months of age have less complete catch-up than those adopted earlier (Rutter & The English and Romanian Adoptees Study Team, 1998; Van IJzendoorn & Juffer, 2006). One meta-analysis suggests that the effect size of PI children's difference in height from parent-reared peers was d = -2.43 at arrival and d = -0.57 after several years in an adoptive family (Van IJzendoorn et al., 2007). Interestingly, when effect sizes of catch-up growth in height were tracked as children grew older, the nearly complete catch-up evident in early and middle childhood (ds = -0.15, -0.29) was replaced by shorter stature among PI children in adolescence and young adulthood (ds = -1.01, -0.70; Van IJzendoorn et al., 2007). While that particular study focused exclusively on physical growth, the findings are consistent with other studies which have found behavioral and emotional problems to emerge when PI children reach adolescence (e.g., Rutter et al., 2010).

While catch-up growth is quite remarkable for physical growth and cognitive development, catch-up in attachment is much less pronounced. At age 4, PI children still have significantly less secure attachment relationships than their parent-reared peers, although they fare better than still-institutionalized children (Bakermans-Kranenburg et al., 2011; Van IJzendoorn & Juffer, 2006); again, children adopted before 12 months of age show more complete catch-up in attachment than those adopted later (Van IJzendoorn & Juffer, 2006).

Intervention effects are generally more likely to be detected proximal to an intervention (Mersky, Topitzes, & Reynolds, 2011), but it is also possible that effects may not emerge until later in development. So-called "sleeper effects" have previously been detected for the effects of some other kinds of intervention programs (Achenbach, Phares, Howell, Rauh, & Nurcombe,

1990; Olds et al., 1997; Reynolds & Robertson, 2003). In the current field, sleeper effects have been detected in several independent samples of PI children; specifically, the negative effects of an older age at adoption are more often detected in adolescence than earlier in childhood (Hawk & McCall, 2011; Merz & McCall, 2010; Rutter et al., 2010; Verhulst, Althaus, & Versluis-Den Bieman, 1990). For example, the ERA study (Rutter et al., 2010) found that emotional problems were not evident in PI youth in childhood, but these problems tended to emerge in adolescence. The authors suggested that this late emergence might relate to the fact that emotional problems generally are less common in childhood than in adolescence; so, a child who is vulnerable to emotional problems might not express this vulnerability until adolescence. Sleeper effects are sometimes explained by early experience affecting the neural substrate for skills and behaviors that emerge later in development (Maurer, Mondloch, & Lewis, 2007); intervention effects on parents' behavior, which then affects children's outcomes years later (Achenbach et al., 1990); or increased statistical power over time (Mersky et al., 2011). It is possible that the elevated social and behavioral demands of adolescence may also contribute to the higher likelihood of difficulties for PI children at this age. Given that PI children typically experience substantial catch-up growth following adoption into supportive families, and that many problems in this population emerge only later in development, it is possible that the effects of enhanced early social-emotional care may also become more evident later in development.

2.0 THE CURRENT STUDY

The current study is the first to examine the longer-term effects of enhanced social-emotional care by regular caregivers in an institution. Previous research has demonstrated that while children are in residence in Baby Homes (BHs), improved social-emotional care is associated with improvements in physical, behavioral, and social-emotional development (The St. Petersburg-USA Orphanage Research Team, 2008). This study aims to determine whether the intervention advantages continue for up to 8 years after adoption and on which measures.

2.1 HYPOTHESES

2.1.1 Attachment and disinhibited social behavior

The typical institutional environment is not supportive of the development of attachment relationships because children experience many and changing caregivers providing insensitive and non-contingently responsive care. Institutionalized children typically do not regularly spend enough time with a specific caregiver (and the care they receive tends to be perfunctory), so it is rare for these children to develop an attachment relationship while in the institution (Bakermans-Kranenburg et al., 2011; Vorria et al., 2003; Zeanah, Smyke, Koga, Carlson, & The Bucharest Early Intervention Project Core Group, 2005). Perhaps because of this lack of an early

attachment relationship, these children have more difficulty forming a secure attachment relationship with their adoptive parents; their attachment relationships tend to be slower to develop and are more often insecure compared to parent-reared children (Chisholm, 1998; Marcovitch et al., 1997; O'Connor et al., 2003). Generally, children who are adopted before 12 months of age have similar rates of secure attachment to their adoptive parents as parent-reared children, but children adopted at a relatively later age are less likely to show secure attachments than non-adopted parent-reared children (Van den Dries, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2009). Furthermore, while catch-up growth is common in many domains of behavior after PI children join adoptive families, catch up is less complete for attachment, especially for children adopted after their first birthday (Bakermans-Kranenburg et al., 2011; Van IJzendoorn & Juffer, 2006).

While children who have a secure attachment relationship tend to have clear preference for certain caregivers, this may not be true for children who lack an early attachment relationship. Post-institutionalized children have been observed to behave in an overly friendly way toward even strangers, which has been labeled either disinhibited social behavior or indiscriminate friendliness (Bruce et al., 2009; Chisholm, 1998; O'Connor et al., 2000). These behaviors are thought to relate to difficulty understanding social cues and social boundaries (Rutter & The English and Romanian Adoptees Study Team, 1998) or to reflect deficits in inhibitory control (Bruce et al., 2009). Indiscriminate friendliness may or may not relate to PI children's attachment with their adoptive parents, but it is thought to emerge due to the lack of sensitive, responsive care from a stable caregiver early in life (Bakermans-Kranenburg et al., 2011).

The intervention in this study aimed to improve the behavioral environment within the institution to make the development of an attachment relationship more likely (The St. Petersburg-USA Orphanage Research Team, 2008). While children still resided in the institution, T+SC caregiver-child dyads were characterized by more mutual, positive, reciprocal engagement than TO or NoI dyads. T+SC children were less emotionally inhibited and demonstrated more attachment behaviors (e.g., higher proximity seeking and contact maintaining, fewer avoidance behaviors) while in residence, and were 2.7x as likely to be classified as having an organized attachment style than TO or NoI children. While indiscriminate friendliness was not formally assessed in the original intervention study, T+SC children were observed to be much more wary around the experimenters and other unfamiliar adults than TO and NoI children. Furthermore, previous studies have suggested that indiscriminate friendliness is associated with less secure attachment relationships (Chisholm, 1996).

Because the intervention created an environment where caregiver-child relationships were more likely to develop, and indeed, such relationships did develop while children were in residence, it is hypothesized that T+SC children will continue to be rated as having more secure attachment relationships and less indiscriminate friendliness than TO and NoI children within their adoptive families. Catch-up growth is not as predominant for attachment as for other outcomes, so non-intervention children are less likely to catch up to the level of intervention children once placed in supportive families. Further, other studies have detected attachment problems in PI children of similar ages as the current study (Chisholm, 1998; Marcovitch et al., 1997; O'Connor et al., 2003), and age at adoption effects on attachment are apparent at these ages (e.g., Smyke et al., 2010; Tan et al., 2010), suggesting that the effects of early experience are likely to be apparent at this stage in development. Because the quality of caregiver-child

relationships for TO children was intermediate between T+SC and NoI while children were in residence, it is hypothesized that TO children will similarly have intermediate attachment and indiscriminate friendliness outcomes after adoption.

2.1.2 Executive function

Executive functioning is thought to develop in the context of adult-child relationships (National Scientific Council on the Developing Child, 2011). From a Vygotskian perspective, social interactions are the vehicle through which children acquire language and other cultural tools that contribute to the development of executive control (S. M. Carlson, 2009). Sensitive and responsive caregivers initially take on the "executive" role for a young child, and scaffold and support a child's emerging skills in everyday situations (e.g., regulating activity level and affect, making choices, following directions) until children are gradually able to take on these roles themselves. A sensitive and responsive caregiver is likely to be most effective in helping children develop executive control in this way because their scaffolding is likely to be more frequent, pleasurable, and effective (S. M. Carlson, 2009). Some researchers have posited that young children are motivated to develop control over their behavior in part to maintain their attachment to a caregiver (Sroufe, 1996). The many and changing caregivers providing insensitive and unresponsive care in institutions undoubtedly create an environment where children receive limited, if any, scaffolding and support of their executive function skills. Further, institutions are often characterized by low quality communicative interactions (Levin & Haines, 2007), limiting resident children's ability to acquire language and other cultural tools that facilitate the development of executive function. The social-emotional neglect and stress that children experience in institutions are associated with problems with attention, executive

function, and emotion regulation (Bos et al., 2009; Colvert, Rutter, Kreppner, et al., 2008; Merz & McCall, 2011; National Scientific Council on the Developing Child 2010, 2011, 2012; Rutter et al., 2010; Stevens et al., 2008; Tottenham et al., 2010). An older age at adoption, or more time in a psychosocially depriving environment, is associated with higher rates of executive function deficits (Merz & McCall, 2011).

The intervention served to make the institution a less stressful, more predictable environment and to facilitate the development of sensitive, responsive relationships between caregivers and resident children. These caregiver-child relationships within the institution are thought to be the context in which executive function develops, so it is hypothesized that the intervention will be associated with improved executive function skills in children after adoption. T+SC children are expected to fare the best, TO children are expected to be intermediate, and NoI children to fare worst of the groups.

2.1.3 Behavior problems

Post-institutionalized children are widely known to have higher rates of behavior problems than parent-reared children, particularly when they experienced more severe levels of deprivation or a relatively longer duration of deprivation (Gunnar, 2001; Juffer & van IJzendoorn, 2005; MacLean, 2003). Higher rates of both internalizing and externalizing problems have been reported (Juffer & van IJzendoorn, 2005) as well as stereotyped behavior (Beckett et al., 2002; Rutter et al., 2010), peer problems (Fisher, Ames, Chisholm, & Savoie, 1997; Gunnar et al., 2007; Rutter, Kreppner, & O'Connor, 2001), and eating problems (Beckett et al., 2002).

There are likely many factors that contribute to the elevated rates of behavior problems in this population. Institutions tend to be unpredictable environments with many and changing caregivers that make it difficult for a child to form an attachment relationship. Institutionalized children may have also been subjected to early adversity or trauma at some point in their history. Unpredictability (Simpson et al., 2012), disorganized early attachment relationships (Van IJzendoorn et al., 1999), and early adversity (Verhulst, 2000) are all associated with higher rates of behavior problems. Furthermore, the behavioral environment of institutions is likely to be stressful for resident children, and the effects of stress experience tend to be more pronounced for children who lack a secure attachment relationship (Gunnar, Fisher, & The Early Experience Stress and Prevention Network, 2006; Kertes, Gunnar, Madsen, & Long, 2008). Chronic stress is associated with later executive function deficits (National Scientific Council on the Developing Child, 2011), and executive function deficits are associated with behavior problems (Eisenberg et al., 2009).

The intervention facilitated higher quality caregiver-child relationships that are hypothesized to make attachment more likely, create a more predictable environment (e.g., see the same caregivers on a regular basis), and lower children's stress levels while in residence. Because all of these factors have been shown to relate to better behavioral functioning, it is hypothesized that T+SC children will ultimately have fewer behavior problems after adoption than NoI children, and TO children are expected to be intermediate.

2.1.4 Age at adoption

Children who remain in a socially-emotionally depriving institution longer or are adopted at a later age[1] tend to have higher rates of a variety of problems than children who are adopted at a younger age (Hawk & McCall, 2011; Julian, 2013; Merz & McCall, 2010). Thus, it might be expected that children in this study who are adopted at later ages will show less secure attachments, more behavior problems, and poorer executive function outcomes; however, these effects may only be apparent at older ages at assessment (Hawk & McCall, 2011; Merz & McCall, 2010, 2011) than the current study includes. It is also possible that age at adoption may interact with intervention group. Whereas more time in a depriving environment (e.g., NoI) would likely be associated with higher rates of problems, more time in a more supportive environment (e.g., T+SC) might be associated with lower rates of problems. While there may be a difference in the age at adoption effect for TO vs. NoI, this effect would likely be less pronounced than that of T+SC vs. NoI because the behavioral environment in TO was not as improved as T+SC.

2.1.5 Years in adoptive home

Adoptive families are typically screened and selected before a child is placed with them, so their homes generally represent the most favorable rearing environments (Hoksbergen, 1999; Julian & McCall, 2011). In fact, adoption is associated with a drastic change in IQ relative to children who remained in institutional care or with their birth families (d = 1.17; Van IJzendoorn, Juffer,

[1] One study of children adopted from institutions in St. Petersburg, Russian Federation found that age at adoption was the best predictor of time in the institution (Hawk et al., 2012).

& Poelhuis, 2005). The first several years after adoption (the period of time that is the focus of the current study) is characterized by massive catch-up growth (Van IJzendoorn et al., 2007; Van IJzendoorn & Juffer, 2006), so at these ages more time in the adoptive home is expected to be associated with fewer problems in all domains.

3.0 METHODS

3.1 PROCEDURE

The current study involves a subset of children from a larger study on the development of children adopted from institutions. In this larger study, adoptive parents were recruited through a local adoption agency. They were first made aware of the study through a newsletter or a letter from the adoption agency. Packets containing numerous assessments were sent to all adoptive parents on a local adoption agency's mailing list in four waves of data collection in 2001, 2003, 2008, and 2010. The response rate was 40% in Wave 1, 37% in Wave 2, 51% in Wave 3, and 38% in Wave 4; some parents responded in more than one wave. This response rate is lower than one of the largest international adoption follow-ups (65.6%) where the response rate was based on a sample who had already shown a non-specific interest in participating (Gunnar et al., 2007); the response rate is higher than the largest follow-up of Romanian adoptees (23.7-30%; Groza & Ryan, 2002). A study of selective responding with the current sample of PI children suggests that there is no evidence of response bias related to degree of adjustment or maladjustment within a single wave of data collection, but over multiple waves, results may under-represent adjustment difficulties (Hawk et al., 2013). Parents were offered a modest payment for completion of the questionnaires. Reminder post-cards were sent or phone calls (Wave 3 and 4 only) were made to parents several weeks after the packets were initially mailed.

Children were included in the current sample if they had been adopted from T+SC after January 1, 2002, TO after March 17, 2003, or NoI after October 18, 2002. These dates correspond to 3 months after the intervention was fully implemented (T+SC and TO) or the end of the baseline assessment period (NoI). Thus, the current study includes children who were part of an intervention study for at least three months while in residence at an institution and now reside with adoptive families in the USA. To maximize the sample size, children who were adopted from other BHs that were not involved in the intervention study or who were adopted from the intervention BHs (T+SC, TO, NoI) prior to the start of the intervention study are also included in the NoI group. Preliminary analyses determined that children from these groups did not differ significantly from the NoI group on any outcome measure, so these groups were merged into a Combined NoI (CNoI) group. Any child with a parent-reported autism spectrum diagnosis (1 in T+SC, 1 in TO, and 5 in CNoI) was excluded from analyses.

3.2 ST. PETERSBURG BABY HOMES

Children in this study were adopted from socially-emotionally depriving "Baby Homes" for children up to four years of age in St. Petersburg, Russian Federation. Prior to any interventions, these Baby Homes were adequate in terms of medical care, nutrition, safety, sanitation, toys, and equipment, but caregiver-child relationships were lacking (The St. Petersburg-USA Orphanage Research Team, 2005, 2008). Caregivers often work 24-hour shifts on non-consecutive days, and children "graduate" to new sets of peers and caregivers as they reach new developmental milestones. As a result, children don't see the same caregivers today as they saw yesterday or will see tomorrow, and they can have 60 to 100 different caregivers by the

time they reach 2 years of age (The St. Petersburg-USA Orphanage Research Team, 2008). Caregivers tend to provide insensitive, unresponsive care, and are rarely emotionally engaged with the children. Care focuses on meeting children's medical and educational needs; caregiver-child interactions and relationships are largely absent. Children in residence in this set of BHs are typically delayed in physical growth and development: 68% of residents are below the 10th percentile of USA non-adopted parent-reared children on the Battelle Developmental Inventory (BDI), and 96% are below the median (The St. Petersburg-USA Orphanage Research Team, 2005). These delays are likely due to the non-supportive orphanage environment or selective outplacement of healthier children.

3.3 INTERVENTION BABY HOMES

3.3.1 No Intervention (NoI)

NoI represents the "care as usual" condition; this BH received no intervention, so care was as described above, but caregivers and resident children were assessed regularly as part of this project. Children adopted from other BHs in Russia that were not a part of this intervention project, or intervention BHs prior to the intervention study, are also included in this group (CNoI).

3.3.2 Training Only (TO)

TO received additional training that focused on early childhood development of typically developing children and children with disabilities. The training encouraged caregivers to interact with children in developmentally appropriate, warm, caring, sensitive, responsive ways, especially while performing routine caregiving duties and during play periods. Caregivers were encouraged to develop relationships with the resident children and care for them much as they would care for their own children.

3.3.3 Training + Structural Changes (T+SC)

T+SC received the same training as TO, but also had a number of structural changes within the BH to create a more family-like atmosphere. Specifically, groups of children were integrated by age and disability status, and periodic "graduations" to new groups were eliminated to create groups in which nearly every child is at a different developmental stage. Group size was also reduced from approximately 12 to 6, and two primary caregivers and four secondary caregivers were assigned to each subgroup so that children saw familiar caregivers each day. This effectively reduced each child's number of caregivers per week from about 12 to 6. A "family hour" was added in the morning and afternoon during which caregivers spent time with the children without children being pulled out or visitors coming in. It was thought that the structural changes would provide an environment that facilitated the development of caregiver-child relationships so the training could be more effectively implemented.

3.3.4 Non-random assignment of Baby Homes

The BHs that are included in the intervention study were selected because they were among the best in St. Petersburg, and their directors were willing to cooperate with the procedures of this project. While the director of T+SC was willing to implement structural changes, the director of TO wanted training without structural changes, and the director of NoI believed strongly in the merits of the "traditional methods" commonly employed in BHs. Thus, each director expressed commitment to the intervention condition that he or she received, and the results cannot be generalized to orphanages that are randomly assigned to similar interventions without the director's commitment.

3.3.5 Sample

For any children who had multiple records available for a given outcome measure, the record with the oldest age at assessment was selected. The oldest age was selected to maximize the chances of any problems being detected because previous reports from this population have found problems to be more common at older ages at assessment (Hawk & McCall, 2011; Merz & McCall, 2010, 2011). However, because it is possible that children who are temporally closer to the intervention (e.g., younger at assessment) would be more likely to demonstrate intervention effects, the main analyses were repeated on a sample comprised of the record with the youngest age at assessment for each child within each outcome measure; no meaningful differences were found between the two sample approaches. In the current study, sample sizes do not allow for longitudinal analyses or comparisons of multiple outcome measures; thus, some individuals have records from different waves included in analyses of different measures.

The full sample for this study includes 53 children from T+SC, 114 from TO, and 238 from a combined NoI group (Table 1), but only a subset of these children has data for each individual measure (*N*s are shown in Table 2). Across all groups, children range from 9 months to nearly 8 years of age at assessment, and they were adopted at between 4 months and 4 years 10 months of age. They have been in their adoptive homes between 2 weeks and nearly 8 years. The vast majority of children come from two-parent households with Caucasian parents who have at least a 4-year college degree; median income for this sample is $125-150,000 (Table 3). Eighty-eight percent of surveys were completed by the child's adoptive mother.

Table 1: Sample description

		T+SC	TO	CNoI	Total
N (Males)		53 (25)	114 (69)	238 (120)	405 (214)
Baby Home	3		114	31	145
	5			1	1
	7			62	62
	12*			110	110
	13	53		23	76
	Other			11	11
Age at Assessment (years)		4.86 (1.74) 1.25-7.78	4.94 (1.75) .75-7.80	4.20 (1.65) 1.00-7.91	4.49 (1.73) .75-7.91
Age at Adoption (months)		18.87 (10.47) 6.21-46.88	12.40 (5.61) 4.66-28.48	11.69 (5.97) 5.09-47.57	12.83 (7.03) 4.66-47.57
Time in Adoptive Home (years)		3.23 (1.93) .20-6.82	3.87 (1.90) .08-7.76	3.20 (1.71) .18-7.21	3.40 (1.82) .08-7.76
Duration of Intervention (months)**		17.90 (9.97) 6.21-46.88	11.99 (5.65) 3.71-28.48	12.65 (6.94) 2.14-35.25	13.58 (7.59) 2.14-46.88
Age at adoption and Duration of Intervention Correlation**		$r(53) = .903$ $p < .001$	$r(114) = .930$ $p < .001$	$r(51) = .870$ $p < .001$	$r(218) = .913$ $p < .001$

*BH12 was the designated No Intervention site during the intervention study.

**Duration of intervention is only available for the BH12 NoI group within the CNoI sample.

Table 2: Means and Standard Deviations, and *N* by Intervention Group

	T+SC	TO	CNoI	Total
AQ	96.63 (7.39)[a]	90.55 (10.17)	91.94 (9.74)	91.99 (9.74)
	8[b]	22	115	145
IF Total	1.91 (1.58)	2.78 (2.41)	2.52 (2.28)	2.51 (2.241)
	34	64	157	255
IF Adult subscale	0.65 (.849)	1.09 (1.422)	1.01 (1.314)	.98 (1.294)
	34	64	158	256
BRIEF-P (*t*)	47.76 (12.03)	47.84 (10.40)	47.62 (9.53)	47.75 (10.44)
	29	55	42	126
CBQ Composite (*z*)	0.24 (1.06)	0.34 (0.94)	0.10 (0.85)	0.23 (0.94)
	45	90	79	214
ITSEA				
Externalizing (*t*)	49.53 (10.54)	49.67 (12.11)	47.41 (7.89)	48.15 (9.25)
	15	27	83	125
Internalizing (*t*)	51.19 (10.04)	51.15 (11.27)	47.24 (7.64)	48.55 (8.94)
	16	27	86	129
Dysregulation (*t*)	40.89 (14.21)	39.10 (16.43)	39.38 (11.27)	39.50 (12.72)
	18	30	103	151
Competence (*t*)	49.87 (13.00)	53.04 (11.13)	52.05 (11.02)	52.00 (11.23)
	15	27	85	127
CBCL 1½ - 5 (*t*)	40.59 (10.92)	45.29 (12.24)	42.24 (9.62)	42.44 (10.08)
	17	21	140	178

[a] mean (standard deviation)
[b] *N*

Table 3: Family characteristics

Mother-report	88.6%
Two-parent household	94.8%
Parent(s) with 4-year college degree or higher education	85.8%
Median income	$125-150,000
Respondent's ethnicity	98.3% white

3.4 MEASURES

3.4.1 23-item Attachment Questionnaire (AQ)

The 23-item AQ (Chisholm, 1998) is comprised of the 23 items with the highest and lowest loadings on the security scale of the Attachment Q-sort (Waters & Deane, 1985), and was administered to parents of children under 3 years of age. Parents rate behavioral descriptions as Very Unlike (1) to Very Like (5) their child. This measure reflects several important aspects of attachment including the child's use of the parent as a source of information and comfort, the child's cooperation and compliance with parental requests, and the child's emotional expression toward the parent. Examples of items include "Your child follows your suggestions readily even when they are clearly suggestions rather than orders," "Your child is demanding and impatient with you. He/she fusses and persists unless you do what he/she wants right away," "If your child is frightened or upset, he/she stops crying and quickly recovers if you hold him/her," "At home your child gets upset or cries when you walk out of the room," and "Your child uses your facial expressions as a good source of information when something looks risky or threatening." No subscales are available for this measure, so a total score will be utilized.

Alpha coefficients for this scale ranged from 0.65 to 0.80 in previous studies of PI children (Chisholm, Carter, Ames, & Morison, 1995; Chisholm, 1998). In the current study, the alpha coefficient was 0.80. In another PI sample, the AQ had a test-retest reliability coefficient of 0.70 (Cohen & Farnia, 2011). This questionnaire shows differences between both Chinese (Cohen & Farnia, 2011) and Romanian (Chisholm et al., 1995; Chisholm, 1998) adoptees compared to parent-reared children, but these differences may fade with increased time in the

adoptive home (Chisholm, 1998; Cohen & Farnia, 2011). Furthermore, children who were rated as securely attached based on a separation-reunion procedure had significantly higher scores on the AQ than children rated as insecurely attached; this was true for both children adopted from Romanian orphanages and parent-reared Canadian children, but the difference between secure and insecure children in a group of children adopted from Romania before 4 months of age was not significant (Chisholm, 1996). Post-institutionalized children's scores on the AQ are also associated with scores on the CBCL (Chisholm, 1996). However, there is some evidence that the AQ may not effectively distinguish between children with secure and insecure-avoidant attachment patterns (Chisholm, 1996).

3.4.2 Indiscriminately Friendly (IF) Behavior Measure

The IF measure (Chisholm, 1998) consists of nine items in which parents rate how their child would react in different situations, and was administered to parents of children under 6 years of age. While the original measure included five items that focused on how children behave in various situations with new adults, the current study added parallel items to assess how children would react in similar situations with new children. Items were: "How friendly is your child with new adults/children?"; "Has your child ever been shy or acted warily around new adults/children?"; "What does your child do when he/she meets new adults/children?"; "How willing would your child be to go home with an adult/child he/she had just met?"; and "Does your child have a tendency to wander away from you? If yes, is your child distressed when he/she finds him/herself separated from you?" Responses were scored 1 for indiscriminately friendly responses (e.g., "My child has never been shy or wary of strangers"), and 0 for all other

responses. An adult subscale, child subscale, and total score (sum of adult and child subscales) for this measure will be utilized.

Alpha coefficients for the adult portion of this scale ranged from 0.46 to 0.72 in previous studies of PI children (Chisholm et al., 1995; Chisholm, 1998); in the current study, alpha coefficients were 0.69 for the adult portion of the scale, 0.72 for the child portion of the scale, and 0.78 for the total scale. The adult portion of the scale discriminated between children adopted after at least 8 months in 1990s Romanian orphanages and both Romanian children adopted before 4 months of age with minimal to no orphanage experience and Canadian-born parent-reared children, and these differences persisted up to 3 years after adoption (Chisholm et al., 1995; Chisholm, 1998).

3.4.3 Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P)

The BRIEF-P (Gioia, Isquith, Guy, & Kenworthy, 2000) is a 63-item measure of 2- to 5-year-old children's executive function. Parents report whether a behavior is never a problem (0), sometimes a problem (1), or often a problem (2). Examples of items include "has trouble concentrating on games, puzzles, or play activities," "repeats the same mistakes over and over even after help is given," "is fidgety, restless, or squirmy," "small events trigger big reactions," and "does not realize that certain actions bother others." In this study, all indices will be used: Inhibitory Self Control Index (Inhibit + Shift), Flexibility Index (Shift + Emotional Control), Emergent Metacognition Index (Working Memory + Plan/Organize), and the Global Executive Composite (Inhibit + Shift + Emotional Control + Working Memory + Plan/Organize).

The BRIEF-P is documented to have adequate reliability and validity; alpha coefficients ranged from 0.80 to 0.90, and test-retest coefficients for the three BRIEF-P indices were also high ranging from 0.80 to 0.90 (Sherman & Brooks, 2010). Children with ADHD were rated higher than age-, sex-, and SES-matched controls on all four indices (Mahone & Hoffman, 2007). In the current study, alpha coefficients were 0.93 for the Inhibitory Self Control Index, 0.88 for the Flexibility Index, 0.92 for the Emergent Metacognition Index, and 0.96 for the Global Executive Composite.

3.4.4 Children's Behavior Questionnaire (CBQ)

The CBQ (Rothbart, Ahadi, Hershey, & Fisher, 2001) is an assessment of temperament in 3 to 7 year-old children. This study administered only the subscales of Impulsivity, Inhibitory Control, and Attentional Focusing because these subscales tap into children's effortful control and executive functioning. Parents report on how true each of 35 statements is for their child from Extremely Untrue (1) to Extremely True (7). Examples of items include "sometimes interrupts others when they are speaking," "has difficulty leaving a project he/she has begun," "is able to resist laughing or smiling when it isn't appropriate," "often rushes into new situations," and "when drawing or coloring in a book, shows strong concentration."

The subscales of the CBQ have adequate reliability and validity (Rothbart et al., 2001). Alpha coefficients for 4-5 and 6-7 year old children were 0.74 and 0.78 for Impulsivity, 0.76 and 0.78 for Inhibitory Control, and 0.67 and 0.69 for Attentional Focusing (Rothbart et al., 2001). Further, mothers' ratings of children's behavior tended to be stable from 5 to 7 years of age (0.73 for Impulsivity, 0.73 for Inhibitory Control, and 0.66 for Attentional Focusing; Rothbart et al.,

2001). In the current study, alpha coefficients were 0.76 for Impulsivity, 0.85 for Inhibitory Control, and 0.77 for Attentional Focusing.

3.4.5 Infant Toddler Social Emotional Assessment (ITSEA)

The ITSEA (Carter & Briggs-Gowan, 2006) is a measure of behavior problems and competencies for children 12 to 36 months old. In the current study, the ITSEA was administered to children up to 48 months of age (Alice Carter, personal communication to Robert B. McCall, 2000). Parents indicate whether 166 statements about their child are Rarely/Not True (0), Sometimes True (1), Often/Very True (2), or No Opportunity to Judge (0). Examples of items include "misbehaves to get attention from adults," "cries or hangs onto you when you try to leave," "is hard to soothe when upset," "stays still while being changed, dressed, or bathed," and "likes being cuddled, hugged, or kissed by loved ones." In this study, all broadband scores (Externalizing, Internalizing, Dysregulation, and Competence) will be used.

In a normative sample, alpha coefficients for these scales ranged from 0.80 to 0.90; test-retest coefficients ranged from 0.82 to 0.90 (Carter, Briggs-Gowan, Jones, & Little, 2003). The ITSEA shows expected correlations with corresponding subscales on the Child Behavior Checklist and the Ages and Stages Questionnaire: Social Emotional, providing evidence for the validity of this measure (Carter & Briggs-Gowan, 2006). In the current sample, alpha coefficients for domain scores ranged from 0.88 to 0.96.

3.4.6 Child Behavior Checklist (CBCL) 1½ - 5

The CBCL for children aged 1½ - 5 (Achenbach & Rescorla, 2000) consists of 99 questions about common behavior problems. Parents report whether each behavioral description is not true (0), sometimes true (1), or very/often true (2) of their child. Examples of items include "afraid to try new things," "disturbed by change in routines," "looks unhappy without good reason," "gets into many fights," and "punishment doesn't change his/her behavior." In this study, the broadband Externalizing and Internalizing scales as well as the Total Behavior Problems scale will be utilized.

The CBCL 1.5-5 is widely used and has adequate reliability and validity (Achenbach & Rescorla, 2000). Another PI sample found alpha coefficients to be 0.82-0.83 for Internalizing, 0.89-0.90 for Externalizing, and 0.93 for Total Behavior Problems (Tan et al., 2010; Tan & Marfo, 2006); in the current study, alpha coefficients were 0.88 for Internalizing, 0.93 for Externalizing, and 0.95 for Total Behavior Problems. This measure discriminates well between clinically-referred and non-referred children (Achenbach & Rescorla, 2000), and the test-retest reliability coefficients for the Internalizing and Externalizing scales were 0.57 and 0.72, respectively in a PI sample (Cohen & Farnia, 2011).

3.4.7 Parent-reported information

Parents reported on which BH their child was adopted from, the child's date of birth, date of adoption (i.e., the date the child came into the family's full time care), and the date the survey was completed. This information was used to determine the child's intervention group, age at adoption, age at assessment, and duration of residence in their adoptive home.

3.5 DATA PREPARATION

Each measure was cleaned to account for missing data. A number of allowed missing data points was determined for each subscale (e.g., up to 2 items out of 5-9 total items on each CBCL 1½-5 subscale, or up to 3 items out of 19 on the aggression subscale). For each missing data point, the whole number closest to the mean of the remaining subscale items was imputed. For parent-reported information (e.g., a child's date of birth and date at adoption), data were checked across all available waves of data, and any discrepancies were reconciled by selecting the date that occurred most often and/or by consulting corroborating data like the parent-reported age of the child.

Whenever possible, data were converted to either *T*-scores or *Z*-scores to create an age-invariant metric. *T*-scores were used for all measures in which *T*-score conversions are provided in the measure's manual (e.g., BRIEF, ITSEA, CBCL 1½-5). When *T*-scores were not available, but age-specific means were available, *Z*-scores were calculated (e.g., CBQ; means taken from Rothbart et al., 2001). Raw scores were used when no *T*-scores or age-specific means were available (e.g., AQ & IF). Means, standard deviations, and sample sizes by intervention group for each measure are presented in Table 2. Intervention group (T+SC, TO, CNoI) comparisons were conducted using dummy codes with CNoI as the reference group.

4.0 RESULTS

4.1 PRELIMINARY ANALYSES

For measures that contain multiple subscales (i.e., IF, BRIEF-P, CBCL 1½ - 5, CBQ, ITSEA), subscales and (when applicable) total scores were correlated to determine whether total/composite scores or individual subscales should be used in the main analyses. The current study included the original adult subscale of the IF measure along with a parallel child subscale and a combined total score. The adult and child subscales were correlated .500 ($p < .001$) with each other and .867 and .865 with the total IF score; thus, further analyses will focus on the total IF score. However, because existing literature contains only the adult portion of this scale, the adult subscale will be used when comparing this PI sample's IF scores to other samples.

For the BRIEF-P, the primary subscales (Inhibitory Self Control Index, Flexibility Index, Metacognition Index) were correlated .542 to .783 (ps < .001) with each other, and .795 to .949 (ps < .001) with the Executive Functioning Index total score. Because of these high intercorrelations, further analyses will use only the Executive Functioning Index total score. The three subscales of the CBQ that were administered (Inhibitory Control, Impulsivity, and Attentional Focusing) were correlated at a magnitude of .434 to .638 (ps < .001); because of these high correlations, a composite score was created by reverse scoring one subscale (Attentional Focusing) and averaging the *Z*-scores for the three subscales.

The broadband scales of the ITSEA (Externalizing, Internalizing, Dysregulation, and Competence) were correlated at a magnitude of .025 to .535 (*ns* to *p*s < .001); because several correlations are quite low, these scales were used in their current form in further analyses. The CBCL 1½ - 5 Internalizing and Externalizing broadband scales were correlated .718 ($p < .001$) with each other, and .873 and .941 (*p*s < .001), respectively, with the Total Problem score; thus, further analyses will use only the Total Problem score.

Because multiple groups were available that did not experience any intervention, these groups were compared on each outcome measure to determine whether the groups could be merged into a larger Combined No Intervention (CNoI) group. The No Intervention groups that were compared were (1) NoI children adopted after the end of the baseline assessment period; (2) T+SC, (3) TO, and (4) NoI children adopted before any interventions began; and (5) children adopted from other BHs in St. Petersburg, Russian Federation at any time. Hierarchical regression analyses were performed to determine whether the five No Intervention groups could be combined; No Intervention groups were dummy coded with group (1) as the reference group. Age at adoption and years in home were entered in Model 1, main effects of no-intervention groups were added in Model 2, and Age at Adoption x No Intervention group interactions were added in Model 3.

For the CBCL 1½ -5, CBQ, Indiscriminately Friendly Behavior Measure, and the ITSEA Externalizing, Internalizing, Dysregulation, and Competence scales, there were no significant effects in any models for No Intervention group comparisons or No Intervention group by Age at Adoption interactions. For the Attachment Questionnaire, while the ΔR^2 was nonsignificant when the No Intervention groups were added to the model, group (2) had significantly higher/better attachment security ratings than group (1); this effect was nonsignificant in Model

3. For the BRIEF-P, the addition of the No Intervention groups to the model contributed a marginally significant ΔR^2 due to group (4) being rated as having significantly higher/worse executive function than group (1); this effect was significant in both Models 2 and 3. Because of the general lack of group differences between No Intervention groups, and inconsistent findings across measures, all No Intervention groups are combined for the main analyses of this study.

4.2 MAIN ANALYSES

Hierarchical regression analyses were conducted to examine the effect of Age at Adoption, Years in Adoptive Home, and intervention group on each outcome variable. This method was chosen because it provides an estimate of the main effect of the intervention over and above any effects of age at adoption and years in the adoptive home, and an estimate of any "dosage" effects of the intervention over and above the main effects. Dummy codes were created to make comparisons between intervention groups (T+SC, TO, CNoI). CNoI will be treated as the reference group so that T+SC and TO are each compared to CNoI. Age at Adoption and Years in Adoptive Home were both centered before entering them into each regression model.

For each outcome variable, the following procedure was followed:

In Step 1, Age at Adoption (continuous) and Years in Adoptive Home (continuous) were entered into the regression model to determine whether there are main effects of these variables on the outcome measure.

Step 1: Age at Adoption (continuous)

Years in Adoptive Home (continuous)

In Step 2, Intervention Group dummy codes were added to the model to determine whether there are any main effects of Intervention Group, and whether Intervention Group explains significantly more variability in the model than Age at Adoption and Years in Home alone.

Step 2: Age at Adoption (continuous)

Years in Adoptive Home (continuous)

Intervention Group: T+SC vs. CNoI

Intervention Group: TO vs. CNoI

In Step 3, interactions between Age at Adoption and Intervention Group dummy codes were added to the model. This tests whether there are dosage effects for the interventions; in other words, does more time in a more supportive institutional environment (T+SC) enhance the effects of the intervention relative to CNoI?

Step 3: Age at Adoption (continuous)

Years in Adoptive Home (continuous)

Intervention Group: T+SC vs. CNoI

Intervention Group: TO vs. CNoI

Age at Adoption x Intervention Group: T+SC vs. CNoI

Age at Adoption x Intervention Group: TO vs. CNoI

Because intervention group sample sizes are relatively small, results are presented for all effects that reach a small effect size, regardless of whether these effects attain statistical significance. The overall R^2 and ΔR^2 for each model, and the semipartial r for each individual

effect were used as estimates of effect sizes in each hierarchical regression. The semipartial *r* was selected as an estimate of effect size for individual effects because it represents the proportion of the variance in the outcome variable that is associated uniquely with the predictor. Following guidelines from Cohen (1992), effect sizes were considered small, medium, or large if they surpassed the cutoffs of .02, .13, and .26 for R^2, or .10, .30, and .50 for *r*.

Mean scores for the overall PI sample and intervention group subsamples (T+SC, TO, and CNoI) were compared to other samples of children using existing studies that used these measures (AQ, IF, CBQ) or the mean for the standardization sample of the measure (BRIEF-P, CBCL, ITSEA). These comparisons were made to determine whether the current PI sample's scores fell within normal ranges or were significantly higher or lower other samples.

4.2.1 23-item Attachment Questionnaire

As seen in Table 4, Model 1 was nonsignificant, and Models 2 and 3 were marginally significant for the Attachment Questionnaire; however, all models had an overall small effect size (R^2s = .025, .063, .085). The addition of intervention groups in Model 2 ($\Delta R^2 = .038$, $p < .10$) and intervention group by age at adoption interactions in Model 3 ($\Delta R^2 = .021$, *ns*) explained a small effect size worth of additional variance versus the previous model. Specifically, age at adoption was marginally significant in Models 2 and 3 with a younger age at adoption associated with better attachment security; the effect size for age at adoption was small in both models (*sr*s = -.159, -.152). While years in adoptive home was non-significant in all models, it had a small effect size in Models 2 and 3 (*sr*s = .121, .113), with more time in the adoptive home associated with better attachment security. The main effect of intervention group comparing T+SC with CNoI was significant in Model 2, and had a small effect size (*sr* = .195); this effect was due to

T+SC having higher attachment security than CNoI. In Model 3, the age at adoption by intervention group (T+SC vs. CNoI) interaction was non-significant but had a small effect size (*sr* = .108) due to T+SC having somewhat better attachment security with older ages at adoption, and the reverse being true for CNoI. Thus, while few effects reached significance, and effect sizes were small, there was a tendency for younger ages at adoption, more time in the adoptive home, prior residence in T+SC, and more time residing in T+SC to be associated with better attachment security.

Overall, the children in the current study (mean age = 36 months; M = 91.99) have higher/better attachment scores than children an average of 30 months old from Chisholm's (1998) study of Romanian adoptees (RO; M = 82.2), Canadian-born children (CB; M = 87.3), and children adopted before 4 months of age (EA; M = 88.8). This was true of the sample as a whole (RO: $t(144) = 12.1$, $p < .001$; CB: $t(144) = 5.794$, $p < .001$; EA: $t(144) = 3.94$, $p < .001$), as well as for the T+SC (M = 96.63; RO: $t(7) = 5.524$, $p < .001$; CB: $t(7) = 3.571$, $p < .01$; EA: $t(7) = 2.997$, $p < .05$) and CNoI (M = 91.94; RO: $t(114) = 10.687$, $p < .001$; CB: $t(114) = 5.091$, $p < .001$; EA: $t(114) = 3.445$, $p < .001$) subsamples. The TO subsample (M = 90.55) had significantly higher/better attachment scores than the RO group ($t(21) = 3.849$, $p < .001$), but did not significantly differ from either the CB ($t(21) = 1.497$, *ns*) or EA ($t(21) = 0.805$, *ns*) groups. In sum, the current sample tends to have higher/better attachment security than both Romanian adoptees (earlier- and later-adopted) and Canadian born non-adopted children, and this was true for nearly all group comparisons.

Table 4. Hierarchical regression of Chisholm's Attachment Questionnaire on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.025	.025	1.835
Age at Adoption	-0.203	0.170	-0.104	-1.192	-.099			
Years in Home	0.688	0.669	0.090	1.029	.085			
Model 2						.063	.038^{+}	2.367^{+1}
Age at Adoption	-0.356	0.183	-0.183	-1.944^{+}	-.159			
Years in Home	1.040	0.700	0.136	1.485[2]	.121			
T+SC vs. CNoI	9.339	3.911	0.220	2.388*	.195			
TO vs. CNoI	1.505	2.483	0.056	0.606	.050			
Model 3						.085	.021	2.129^{+3}
Age at Adoption	-0.392	0.211	-0.202	-1.862^{+}	-.152			
Years in Home	0.979	0.707	0.128	1.385	.113			
T+SC vs. CNoI	4.320	5.179	0.102	0.834	.068			
TO vs. CNoI	3.608	3.043	0.133	1.186	.097[4]			
Age at Adoption x T+SC vs. CNoI	0.710	0.536	0.171	1.324	.108			
Age at Adoption x TO vs. CNoI	-0.610	0.605	-0.115	-1.008	-.082			

*$p < .05$, $^{+}p < .10$

[1] This effect was significant ($R^2 = 0.065$, $F(4, 145) = 2.444$, $p < .05$) in a parallel model in which the youngest age record was selected for each child.

[2] This effect was marginally significant ($\beta = 0.152$, $t = 1.670$, $p < .10$, $sr = 0.139$) in a parallel model in which the youngest age record was selected for each child.

[3] This effect was significant ($R^2 = 0.086$, $F(6, 145) = 2.172$, $p < .05$) in a parallel model in which the youngest age record was selected for each child.

[4] This effect reached a small effect size ($\beta = 0.142$, $t = 1.264$, *ns*, $sr = 0.103$) in a parallel model in which the youngest age record was selected for each child.

4.2.2 Indiscriminately Friendly (IF) Behavior Measure

Models 1, 2, and 3 were all nonsignificant, as were each of the ΔR^2 (Table 5); however, the overall R^2 for Models 2 and 3 reached a small effect size (R^2 = .030, .033). The effect of years in home was marginally significant in Model 1, and significant in Models 2 and 3, all with small effect sizes (*sr*s = .121, .127, .130); this effect was due to children demonstrating somewhat more indiscriminately friendly behavior with more time in the adoptive home. Models 2 and 3 had a marginal effect of Intervention Group (T+SC vs. CNoI), with small effect sizes (*sr*s = -.105, -.109) due to children from T+SC displaying less indiscriminately friendly behavior than children from CNoI. Overall, while effect sizes are small, more time in the adoptive home and

prior residence in CNoI (relative to T+SC) are associated with more indiscriminately friendly behavior.

For the adult subscale of the IF measure, the current sample (mean age = 43 months; M = 0.98) has significantly lower levels of indiscriminately friendly behavior than Chisholm's (1998) sample of Romanian adoptees who were an average of 30 months old (RO; M = 2.6, $t(255)$ = -20.027, $p < .001$); this was true for each of the three intervention groups (T+SC: M = 0.65, $t(33)$ = -13.419, $p < .001$; TO: M = 1.09, $t(63)$ = -8.472, $p < .001$; CNoI: M = 1.01, $t(157)$ = -15.247, $p < .001$). The current sample of PI children also had significantly lower indiscriminately friendly behavior ratings than Chisholm's (1998) sample of children adopted before 4 months of age (M = 1.6), $t(255)$ = -7.661, $p < .001$, and again this was true for each of the three intervention groups (T+SC: $t(33)$ = -6.548, $p < .001$; TO: $t(63)$ = -2.848, $p < .01$; CNoI: $t(157)$ = -5.68, $p < .001$). Thus, children in the current study were reported to have less indiscriminately friendly behavior than samples of children adopted from Romania (earlier- and later-adopted; scores were not available for Canadian born non-adopted children).

Table 5. Hierarchical regression of Chisholm's Indiscriminate Friendliness measure on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.015	.015	1.911
Age at Adoption	0.012	0.023	0.036	0.524	.033			
Years in Home	0.223	0.115	0.132	1.936^{+}	.121			
Model 2						.030	.015	1.925
Age at Adoption	0.030	0.025	0.087	1.168	.073			
Years in Home	0.236	0.116	0.140	2.041*[1]	.127			
T+SC vs. CNoI	-0.780	0.462	-0.119	-1.688^{+}	-.105			
TO vs. CNoI	0.187	0.333	0.036	0.563	.035			
Model 3						.033	.003	1.407
Age at Adoption	0.008	0.036	0.023	0.225	.014			
Years in Home	0.246	0.119	0.146	2.074*[2]	.130			
T+SC vs. CNoI	-0.863	0.496	-0.131	-1.738^{+}	-.109			
TO vs. CNoI	0.223	0.336	0.043	0.662	.041			
Age at Adoption x T+SC vs. CNoI	0.039	0.052	0.074	0.746	.047			
Age at Adoption x TO vs. CNoI	0.046	0.065	0.053	0.703	.044			

*$p < .05$, $^{+}p < .10$

[1] This effect was marginally significant (β = 0.122, t = 1.787, $p < .10$, sr = 0.112) in a parallel model in which the youngest age record was selected for each child.

[2] This effect was marginally significant (β = 0.128, t = 1.837, $p < .10$, sr = 0.115) in a parallel model in which the youngest age record was selected for each child.

4.2.3 Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P)

As seen in Table 6, Model 1 was significant whereas Models 2 and 3 were nonsignificant, although all models had overall small effect sizes (R^2s = .048, .048, .074). The addition of intervention group comparisons in Model 2 did not explain additional variance over Model 1 (ΔR^2 = .000, *ns*), but the addition of intervention group by age at adoption interactions in Model 3 explained a small effect size worth of variance over Model 2 (ΔR^2 = .025, *ns*). In all models, the effect of years in home was significant with a small effect size (*sr*s = .211, .210, .198) due to children being rated as having worse executive function skills with more time in the adoptive home. The small effect size of the addition of age at adoption by intervention group interactions to the model was related to both intervention group comparisons (T+SC vs. CNoI and TO vs.

CNoI). Specifically, for both T+SC (*sr* = .127) and TO (*sr* = .146), an older age at adoption is associated with worse executive function ratings, whereas for CNoI, an older age at adoption is associated with better executive function ratings. Thus, more time in the adoptive home, and a longer prior residence in an intervention BH (T+SC, TO) or shorter prior residence in CNoI are associated with poorer EF skills.

While the overall sample (M = 47.75) had BRIEF-P scores that were slightly, but significantly, lower/better than the mean (M = 50.00) of the standardization sample of this measure ($t(125) = -2.424$, $p < .05$), this was not true for any of the intervention group subsamples (T+SC: M = 47.76, $t(28) = -1.003$, *ns*; TO: M = 47.84, $t(54) = -1.543$, *ns*); CNoI: M = 47.62, $t(41) = -1.619$, *ns*). Scores from this PI sample are overall largely consistent with the standardization sample, though slightly lower/better.

Table 6. Hierarchical regression of BRIEF-P on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.048	.048*	3.108*
Age at Adoption	0.173	0.159	0.129	1.086	.096			
Years in Home	2.414	1.008	0.283	2.394*	.211			
Model 2						.048	.000	1.541
Age at Adoption	0.185	0.176	0.137	1.053	.093			
Years in Home	2.448	1.034	0.287	2.366*	.210			
T+SC vs. CNoI	-0.143	2.659	-0.006	-0.054	-.005			
TO vs. CNoI	0.354	2.128	0.017	0.167	.015			
Model 3						.074	.025	1.574
Age at Adoption	-0.180	0.286	-0.133	-0.628	-.055			
Years in Home	2.433	1.082	0.286	2.248*	.198			
T+SC vs. CNoI	-0.247	2.692	-0.010	-0.092	-.008			
TO vs. CNoI	1.226	2.209	0.058	0.555	.049			
Age at Adoption x T+SC vs. CNoI	0.450	0.312	0.239	1.443	.127			
Age at Adoption x TO vs. CNoI	0.609	0.369	0.207	1.649	.146			

*$p < .05$, $^{+}$ $p < .10$

4.2.4 Children's Behavior Questionnaire (CBQ)

While no models were statistically significant (Table 7), Models 2 and 3 had an overall R^2 with a small effect size (*sr*s = .025, .051). The addition of intervention groups in Model 2 was nonsignificant, and the addition of intervention group by age at adoption interactions in Model 3 was marginally significant with a small effect size (ΔR^2 = .026, p <.10). Specifically, although years in home was a nonsignificant variable in all models, it had a small effect size in Models 1 and 2 (*sr*s = -.100, -.100) due to children having somewhat lower/worse scores with more time in the adoptive home. In Model 2, the effect of intervention group for TO vs. CNoI was marginally significant and had a small effect size (*sr* = .119) due to children from TO having higher/better scores than CNoI children. While this effect was nonsignificant in Model 3, the age at adoption interaction with TO vs. CNoI was significant with a small effect size (*sr* = -.139) due to CNoI children having higher/better scores with older ages at adoption and the reverse being true for TO; however, this effect appears to be largely due to one early-adopted child in the TO group having especially high/good scores on the CBQ. Thus, overall, few effects reached significance, but more time in the adoptive home might be associated with lower/worse CBQ scores.

The overall PI sample (M = 0.23) had significantly higher/better scores than the mean (M = 0.00) for these selected subscales. While this was true for the TO subsample (M = 0.34, $t(89)$ = 3.423, p < .001), neither the T+SC (M = 0.24, $t(44)$ = 1.511, *ns*) nor CNoI (M = 0.10, $t(78)$ = 1.008, *ns*) subsamples were significantly different from the mean. Thus, overall CBQ scores in this PI sample are largely consistent with a sample of typical non-adopted children.

Table 7. Hierarchical regression of Child Behavior Questionnaire (Composite of Impulsivity, Attentional Focusing, and Inhibitory Control subscales) on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.011	.011	1.094
Age at Adoption	-0.004	0.010	-0.037	-0.464	-.032			
Years in Home	-0.068	0.047	-0.116	-1.450	-.100			
Model 2						.025	.014	1.287
Age at Adoption	-0.003	0.010	-0.029	-0.347	-.024			
Years in Home	-0.067	0.047	-0.115	-1.440	-.100			
T+SC vs. CNoI	0.115	0.185	0.050	0.623	.043			
TO vs. CNoI	0.253	0.147	0.132	1.716^{+}	.119			
Model 3						.051	.026^{+1}	1.801
Age at Adoption	0.011	0.017	0.089	0.622	.043			
Years in Home	-0.062	0.046	-0.106	-1.342	-.092[2]			
T+SC vs. CNoI	0.043	0.188	0.019	0.231	.016			
TO vs. CNoI	0.180	0.150	0.094	1.204	.083			
Age at Adoption x T+SC vs. CNoI	-0.002	0.021	-0.011	-0.090	-.006			
Age at Adoption x TO vs. CNoI	-0.048	0.024	-0.199	-2.033*[3]	-.139			

*$p < .05$, $^{+}p < .10$

[1] This effect was nonsignificant ($\Delta R^2 = .021$, *ns*) in a parallel model in which the youngest age record was selected for each child.

[2] This effect reached a small effect size ($\beta = -0.121$, $t = -1.347$, *ns*, $sr = -.104$) in a parallel model in which the youngest age record was selected for each child.

[3] This effect was marginally significant ($\beta = -0.180$, $t = -1.684$, $p < .10$, $sr = -.130$) in a parallel model in which the youngest age record was selected for each child.

4.2.5 Infant Toddler Social Emotional Assessment (ITSEA)

Separate regressions were run for each of the four broadband scales of the ITSEA.

4.2.5.1 Externalizing

As seen in Table 8, Models 1 and 2 had a small overall effect size ($R^2 = .066, .070$), and Model 3 had a medium overall effect size ($R^2 = .148$), with Models 1 and 3 statistically significant and Model 2 marginally significant. The addition of intervention groups to Model 2 did not explain significant additional variance, but the addition of age at adoption by intervention group interactions did explain significant additional variance with a small effect size ($\Delta R^2 = .078$, $p <$

.01). Specifically, age at adoption contributed a small effect size worth of variance in all three models (*sr*s = .244, .231, .115), and this effect was significant in Models 1 and 2. An older age at adoption was associated with higher/worse Externalizing scores. The effect of years in home was nonsignificant in all models, but reached a small effect size in Model 3 (*sr* = .105) due to more time in the adoptive home being associated with higher/worse Externalizing scores. Furthermore, the age at adoption by intervention group (TO vs. CNoI) was statistically significant with a small effect size (*sr* = .276); while each intervention group showed higher/worse Externalizing scores with older ages at adoption, the slope was steeper in TO than in CNoI. In sum, older ages at adoption, especially for TO children, and possibly more time in the adoptive home, are associated with higher/worse Externalizing scores.

The overall PI sample (M = 48.15) had slightly, but significantly, lower/better Externalizing scores than the mean for the ITSEA standardization sample (M = 50.00), $t(124) = -2.233$, $p < .05$. This was true for the CNoI subsample (M = 47.41; $t(82) = -2.989$, $p < .01$), but the T+SC (M = 49.53; $t(14) = -0.171$, *ns*) and TO (M = 49.67; $t(26) = -0.143$, *ns*) subsamples were not significantly different from the mean. Therefore, the current PI sample's overall Externalizing scores are largely consistent with the standardization sample.

Table 8. Hierarchical regression of ITSEA Externalizing on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.066	.066*	4.286*
Age at Adoption	0.444	0.160	0.286	2.785**	.244			
Years in Home	0.887	1.298	0.070	0.683	.060			
Model 2						.070	.005	2.264$^+$
Age at Adoption	0.488	0.186	0.314	2.623**	.231			
Years in Home	1.050	1.330	0.083	0.789	.069			
T+SC vs. CNoI	-1.790	2.927	-0.063	-0.611	-.054			
TO vs. CNoI	0.526	2.110	0.023	0.249	.022			
Model 3						.148	.078**	3.418**
Age at Adoption	0.272	0.201	0.175	1.349	.115			
Years in Home	1.607	1.296	0.127	1.241	.105			
T+SC vs. CNoI	-2.597	3.424	-0.092	-0.758	-.064			
TO vs. CNoI	-1.921	2.208	-0.086	-0.870	-.074			
Age at Adoption x T+SC vs. CNoI	0.419	0.393	0.141	1.065	.090			
Age at Adoption x TO vs. CNoI	1.606	0.495	0.337	3.245**	.276			

$^{**}p < .01$, $^{*}p < .05$, $^{+}p < .10$

4.2.5.2 Internalizing

While each of the three models had a small overall effect size (R^2 = .043, .060, .089), Models 1 and 3 were only marginally significant and Model 2 was nonsignificant (Table 9). The addition of intervention groups to Model 2 did not explain significant additional variance, but the addition of age at adoption by intervention group interactions did explain a small effect size worth of variance (ΔR^2 = .029, *ns*). In Models 1 and 2, an older age at adoption was associated with higher/worse Internalizing scores with a small effect size (*sr*s = .185, .117), though this effect was only statistically significant in Model 1. While not statistically significant, the TO vs. CNoI intervention group comparison had a small effect size in Model 2 (*sr* = .127) due to children from TO having slightly higher/worse Internalizing scores than children from CNoI. Furthermore, the age at adoption by intervention group (TO vs. CNoI) comparison was marginally significant with a small effect size (*sr* = .167); while each intervention group showed somewhat higher/worse Internalizing scores with older ages at adoption, the slope was steeper in

TO than in CNoI. Thus, older ages at adoption, especially for graduates of TO, are associated with higher/worse Internalizing scores.

The overall PI sample (M = 48.55) had marginally lower/better Internalizing scores than the mean for the measure (M = 50.00), $t(128) = -1.842$, $p < .10$. While the CNoI (M = 47.24, $t(85) = -3.342$, $p < .001$) subsample had significantly lower/better Internalizing scores than the mean, neither the T+SC (M = 52.29, $t(15) = 0.473$, *ns*) nor TO (M = 51.15, $t(26) = 0.529$, *ns*) subsamples differed significantly from the mean. This suggests that the current PI sample's internalizing scores are largely consistent with the standardization sample.

Table 9. Hierarchical regression of ITSEA Internalizing on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.043	.043[+a]	2.839[+1]
Age at Adoption	0.327	0.154	0.217	2.121*	.185			
Years in Home	0.232	1.253	0.019	0.185	.016			
Model 2						.060	.017	1.991[2]
Age at Adoption	0.232	0.174	0.154	1.339	.117			
Years in Home	0.109	1.261	0.009	0.087	.008			
T+SC vs. CNoI	2.150	2.687	0.080	0.800	.070			
TO vs. CNoI	2.974	2.037	0.136	1.460	.127			
Model 3						.089	.029	1.989[+]
Age at Adoption	0.098	0.200	0.065	0.492	.043			
Years in Home	0.363	1.267	0.030	0.287	.025			
T+SC vs. CNoI	1.828	3.082	0.068	0.593	.051			
TO vs. CNoI	1.416	2.222	0.065	0.637	.055			
Age at Adoption x T+SC vs. CNoI	0.241	0.367	0.084	0.655	.057			
Age at Adoption x TO vs. CNoI	0.952	0.492	0.206	1.934[+]	.167			

*$p < .05$, [+]$p < .10$

[1] This effect was significant ($R^2 = .050$, $F(2, 122) = 3.133$, $p < .05$) in a parallel model in which the youngest age record was selected for each child.

[2] This model was marginally significant ($F(4, 122) = 2.034$, $p < .10$) in a parallel model in which the youngest age record was selected for each child.

4.2.5.3 Dysregulation

As seen in Table 10, all three models were statistically significant with a small effect size (R^2s = .063, .073, .123). While the addition of intervention groups to Model 2 did not explain significant additional variance, the addition of age at adoption by intervention group interactions was significant and explained a small effect size worth of variance (ΔR^2 = .051, $p < .05$). In all three models, an older age at adoption was associated with a significantly higher/worse Dysregulation scores with a small effect size (*sr*s = .248, .263, .178). More time in the adoptive home was also associated with higher/worse Dysregulation scores in all three models with a small effect size (*sr*s = .138, .145, .167), although this effect was only significant in Model 3, and marginally significant in Models 1 and 2. Intervention effects were not significant in Model 2, but the TO vs. CNoI comparison was significant with a small effect size (*sr* = -.175) in Model 3 due to children from CNoI having higher/worse Dysregulation scores than children from TO. Model 3 also had a significant interaction between age at adoption and the TO vs. CNoI intervention group comparison (*sr* = .220); specifically, while each intervention group showed somewhat higher/worse Dysregulation scores with older ages at adoption, the slope was steeper in TO than in CNoI. However, this effect is largely attributable to one later-adopted TO child who was rated as being especially high on the Dysregulation scale. In sum, an older age at adoption, more time in the adoptive home, and prior residence in CNoI (relative to TO) are associated with higher/worse Dysregulation scores.

The overall PI sample (M = 39.50) had significantly lower/better Dysregulation scores than the mean (M = 50.00, $t(150)$ = -10.143, $p < .001$), and this was true for each of the intervention groups (T+SC: M = 40.89, $t(17)$ = -2.719, $p < .05$; TO: M = 39.10, $t(29)$ = -3.632, $p < .001$; CNoI: M = 39.38, $t(102)$ = -9.569, $p < .001$). Thus, PI children in the current sample were

rated as being less dysregulated, on average, than typical non-adopted children in the standardization sample.

Table 10. Hierarchical regression of ITSEA Dysregulation on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.063	.063**	4.994**
Age at Adoption	0.606	0.194	0.272	3.121*	.248			
Years in Home	2.392	1.377	0.152	1.738^{+}	.138			
Model 2						.073	.009	2.859*
Age at Adoption	0.723	0.219	0.325	3.299**	.263			
Years in Home	2.518	1.384	0.160	1.819^{+1}	.145			
T+SC vs. CNoI	-3.239	3.521	-0.083	-0.920	-.073			
TO vs. CNoI	-2.786	2.706	-0.088	-1.030	-.082			
Model 3						.123	.051*	3.373**
Age at Adoption	0.576	0.252	0.259	2.286*	.178			
Years in Home	2.919	1.367	0.185	2.135*	.167			
T+SC vs. CNoI	-1.656	4.014	-0.042	-0.413	-.032			
TO vs. CNoI	-6.653	2.973	-0.209	-2.238*	-.175			
Age at Adoption x T+SC vs. CNoI	-0.065	0.496	-0.015	-0.132	-.010			
Age at Adoption x TO vs. CNoI	1.898	0.673	0.276	2.822**	.220			

$^{**}p < .01$, $^{*}p < .05$, $^{+}p < .10$

[1] This effect reached significance (β = 0.185, *t* = 2.065, *p* < .05, *sr* = .168) in a parallel model in which the youngest age record was selected for each child.

4.2.5.4 Competence

Neither Models 1 nor 2 explained a significant portion of the variance in Competence scores (Table 11). Model 3 was marginally significant with a small effect size (R^2 = .092), and the addition of age at adoption by intervention group interactions contributed a significant amount of additional variance over Model 2, with a small effect size (ΔR^2 = .072, $p < .01$). While the effect of age at adoption was nonsignificant in all models, it reached a small effect size in Model 1 (*sr* = -.100), with older ages at adoption associated with lower/worse Competence scores. In Model

3, the effect of intervention group TO vs. CNoI was nonsignificant but had a small effect size (*sr* = .132) due to children from TO having higher/better Competence scores than children from CNoI. Furthermore, both the T+SC vs. CNoI and TO vs. CNoI intervention group by age at adoption interactions were statistically significant with small effect sizes (*sr*s = -.176, -.229); while older ages at adoption were associated with relatively lower/worse Competence scores in both T+SC and TO, CNoI had similar Competence scores at higher and lower ages at adoption. In sum, an older age at adoption and longer residence in T+SC or TO in particular, are associated with lower/worse Competence scores.

The overall PI sample (M = 52.00) has slightly, but significantly, higher/better Competence scores than the mean for the measure (M = 50.00), $t(126) = 2.007$, $p < .05$. However, this difference was nonsignificant for both T+SC (M = 49.87, $t(14) = -0.04$, *ns*) and TO (M = 53.04, $t(26) = 1.418$, *ns*); CNoI children (M = 52.05, $t(84) = 1.712$, $p < .10$) had only marginally higher/better scores than the mean for the measure. Thus, Competence scores for this sample of PI children are largely consistent with those of children in the ITSEA standardization sample.

Table 11. Hierarchical regression of ITSEA Competence on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.015	.015	0.939
Age at Adoption	-0.223	0.198	-0.118	-1.127	-.100			
Years in Home	0.110	1.617	0.007	0.068	.006			
Model 2						.020	.005	0.633
Age at Adoption	-0.249	0.231	-0.132	-1.078	-.097[1]			
Years in Home	0.129	1.657	0.008	0.078	.007			
T+SC vs. CNoI	-0.016	3.645	0.000	-0.004	.000			
TO vs. CNoI	2.050	2.625	0.075	0.781	.070			
Model 3						.092	.072**	2.034[+]
Age at Adoption	0.074	0.251	0.039	0.295	.026			
Years in Home	-0.452	1.621	-0.029	-0.279	-.024			
T+SC vs. CNoI	3.746	4.311	0.108	0.869	.076			
TO vs. CNoI	4.239	2.784	0.155	1.523[2]	.132			
Age at Adoption x T+SC vs. CNoI	-0.997	0.492	-0.276	-2.028*[3]	-.176			
Age at Adoption x TO vs. CNoI	-1.633	0.619	-0.283	-2.638**	-.229			

**$p < .01$, *$p < .05$, [+]$p < .10$

[1] This effect had a small effect size (β = -0.185, *t* = -1.460, *ns*, *sr* = .134) in a parallel model in which the youngest age record was selected for each child.

[2] This effect was marginally significant (β = 0.181, *t* = 1.739, *p* < .10, *sr* = .155) in a parallel model in which the youngest age record was selected for each child.

[3] This effect was marginally significant (β = -0.269, *t* = -1.935, *p* < .10, *sr* = -.172) in a parallel model in which the youngest age record was selected for each child.

4.2.6 Child Behavior Checklist (CBCL) 1 ½ - 5

Models 1, 2, and 3 were all nonsignificant, although Models 2 and 3 had overall R^2 with a small effect size (R^2s = .026, .030). The addition of intervention groups in Model 2 was nonsignificant but had a small effect size (ΔR^2 = .020, *ns*), and the addition of intervention group by age at adoption interactions in Model 3 explained no additional variance in the model (Table 12). Specifically, in Model 2, but not in Models 1 and 3, age at adoption explained a small effect size worth of variance (*sr*s = .117), with children who were relatively older at adoption having somewhat higher/worse scores on the CBCL 1½-5. Furthermore, the intervention group comparison of T+SC vs. CNoI was nonsignificant but had a small effect size (*sr* = -.108) due to

children from CNoI having somewhat higher/worse scores than children from T+SC. In sum, while effects were small, there was a slight tendency for children who were adopted at relatively older ages or who previously resided in CNoI (relative to T+SC) to have higher levels of CBCL behavior problems.

The overall PI sample (M = 42.44) had significantly lower/better behavior problem scores than the mean for the standardization sample of this measure (M = 50.00), $t(177) = -10.005$, $p < .001$. This was true for the T+SC group (M = 40.59, $t(16) = -3.553$, $p < .01$) and the CNoI group (M = 42.24, $t(139) = -9.552$, $p < .001$), but the TO group (M = 45.29, $t(20) = -1.764$, $p < .10$) had only marginally lower/better behavior problem scores than the mean.

Table 12. Hierarchical regression of CBCL 1½ - 5 on Age at Adoption, Years in Home, Intervention Group (T+SC, TO, CNoI), and Age at Adoption x Intervention Group.

	B	SE(B)	β	*t*	*sr*	R^2	ΔR^2	*F*
Model 1						.007	.007	0.596
Age at Adoption	0.109	0.105	0.085	1.038	.079[1]			
Years in Home	0.443	0.633	0.057	0.700	.053			
Model 2						.026	.020	1.157
Age at Adoption	0.196	0.127	0.152	1.544	.117			
Years in Home	0.397	0.650	0.051	0.610	.046			
T+SC vs. CNoI	-4.461	3.131	-0.131	-1.425	-.108			
TO vs. CNoI	2.179	2.439	0.070	0.893	.067			
Model 3						.030	.004	0.881
Age at Adoption	0.151	0.152	0.117	0.993	.075[2]			
Years in Home	0.485	0.663	0.063	0.732	.055			
T+SC vs. CNoI	-4.897	3.846	-0.144	-1.273	-.096[3]			
TO vs. CNoI	1.954	2.472	0.063	0.790	.060			
Age at Adoption x T+SC vs. CNoI	0.088	0.260	0.046	0.338	.026			
Age at Adoption x TO vs. CNoI	0.406	0.501	0.066	0.810	.061			

*$p < .05$, $^{+}p < .10$

[1] This effect reached a small effect size (β = 0.113, *t* = 1.303, *ns*, *sr* = 0.106) in a parallel model in which the youngest age record was selected for each child.

[2] This effect reached a small effect size (β = 0.187, *t* = 1.436, *ns*, *sr* = 0.117) in a parallel model in which the youngest age record was selected for each child.

[3] This effect reached a small effect size (β = -0.159, *t* = -1.327, *ns*, *sr* = -0.108) in a parallel model in which the youngest age record was selected for each child.

4.2.7 Youngest age at assessment

The hierarchical regression analyses for each outcome measure were repeated using a sample in which the youngest-age record for each child for each outcome measure was selected. For the vast majority of effects, there were no differences in significance level or effect size between the two approaches. In some cases, effects that were marginally significant in the original regression became nonsignificant or significant, or an effect that fell just below the cut-off for a small effect size reached a small effect size when the youngest age at assessment was selected. Overall, however, the two approaches do not differ in any meaningful ways from one another. Footnotes in Tables 4 through 12 denote all instances in which effects differed in significance levels or effect sizes between the two approaches.

5.0 DISCUSSION

The current study is the first to examine the longer-term effects of enhanced social-emotional care by regular caregivers in an institution. Parents reported on their adopted children who previously resided in a St. Petersburg, Russian Federation Baby Home and received either care as usual (CNoI), Training Only (TO), or Training and Structural Changes (T+SC). While children were still in residence in the institution, there were clear differences between all three groups in their physical, behavioral, and social-emotional development with T+SC faring the best, TO intermediate, and NoI having the poorest outcomes (St. Petersburg-USA Orphanage Research Team, 2008). This study aimed to determine whether benefits of the intervention persisted up to 8 years after children were adopted into supportive families. Overall, while there are some small residual effects of the intervention when children are assessed after adoption, graduates of each intervention group are functioning very well in early childhood.

5.1 INTERVENTION EFFECTS

Graduates of intervention BHs tend to have better attachment security (T+SC only), lower levels of indiscriminately friendly behavior (T+SC only), fewer behavior problems (T+SC only), and higher levels of Internalizing problems (TO only) than CNoI. While most effects were in the expected direction with intervention groups faring better than CNoI, intervention groups had

higher levels of internalizing problems and all effects were small in magnitude. Further, T+SC did not emerge as uniformly better than TO. However, because of the relatively small intervention group sample sizes, it is possible that when TO emerged as "best," it was driven by one or two TO graduates who were rated in an extreme; in fact, this was observed in some analyses. Another possible reason for the relative success of TO children is that in the years after the intervention was fully implemented, the developmental status of children admitted to TO began to improve; that is, progressive changes in the admission patterns across BHs may have contributed to BH differences.

The intervention focused on training caregivers to provide more sensitive and responsive care to resident children, and creating an environment where relationships could develop. The finding that intervention children's attachment continues to show benefits over CNoI children after adoption provides important evidence that although their early attachment relationships were broken through adoption, these early relationships prepared them well to attach to their adoptive parents. The lower rates of indiscriminately friendly behavior among T+SC children after adoption also supports the idea that while in the institution, they received adequate support and nurturance from their caregivers and learned the rules of social relationships. On average, T+SC children did not have to resort to indiscriminately friendly behavior to get their needs met in the institution, and so this behavior did not carry over to (and get reinforced in) the adoptive home. The somewhat better outcomes for behavior problems among intervention children are likely to reflect the more predictable and less stressful environment of intervention BHs and the higher likelihood of children developing a secure attachment with a caregiver. These improved circumstances in their early life are thought to decrease the risk for behavior problems later on. Because intervention graduates' internalizing scores are near average and CNoI graduates'

scores are particularly low/ “good”, it is possible that these group differences reflect the blunted emotional expression of CNoI children who experienced institutional care that lacked adequate sensitivity and responsiveness of caregivers and encouraged conforming and obedient behavior.

While there has been limited research examining the persistence of effects of institutional interventions after adoption, research on the persistence of effects of non-institutional interventions may be informative. Effects of early interventions nearly always decay over time, in part because the increment in skills related to the intervention becomes less as a child continues to grow and develop more skills; but even in cases when effects fade, interventions can be extremely valuable (Fraley et al., 2013). Studies of non-institutional interventions aimed to improve early maternal sensitivity have found mixed effects as children grew older; only some children appeared to show lasting benefits of the intervention on their attachment and behavior problems (Bakermans-Kranenberg et al., 2003; Egeland et al., 2000; Van IJzendoorn et al., 1995). Studies of longer-term effects of home visiting programs and early educational interventions have had similarly mixed findings. Some studies have found that effects fade over time (McCarton et al., 1997; Schweinhart et al., 2005), possibly due to non-intervention children catching up to intervention children (Barnett, 2011), and others suggest that effects can be small in magnitude overall, and effects detected at earlier ages may be smaller than those detected at older ages (Magnuson et al., 2007).

Thus, the modest effects detected in the current study could be attributable to a number of factors. For instance, resilience might characterize most PI adoptees specifically at younger ages of assessment, or resilience might characterize a subset of PI adoptees throughout their lifespan. In addition, the drastic change in quality of care between CNoI and adoptive homes might produce impressive catch-up growth that washes away most intervention effects. Finally, it is

possible that sleeper effects exist such that modest effects at younger ages might give way to more noticeable effects in adolescence.

5.1.1 Resilience

One of the clearest findings of this study is that overall, graduates of all intervention groups are functioning quite well in early childhood. In most respects, the current PI sample is indistinguishable from non-adopted parent-reared children at these ages of assessment. It is important to note that despite relative differences between intervention conditions, all groups are, on average, within the normal range. Statements about one group being "worse" than another do not imply extreme scores or psychopathology, but rather differences within the normal range of behavior.

Interestingly, in some domains, like attachment, indiscriminately friendly behavior, behavior problems, and dysregulation, the current PI sample was rated as functioning significantly *better* than comparison samples of non-adopted parent-reared children. This is particularly remarkable considering that the majority of children in the current study experienced "care as usual" in the BH (CNoI), which was characterized by many and changing caregivers providing insensitive and unresponsive care. However, one interpretation of these findings is that persistence of the institutional behavioral culture can cause children to "look" better functioning on some measures. For instance, traditional institutions encourage conformity and obedience, and resident children gradually learn that their bids for attention are not responded to. They may learn not to communicate their needs to a caregiver (e.g., remaining silent upon waking up instead of calling for a caregiver), and thus may be seen by their adoptive parents as "easy babies".

Another potential explanatory factor is that adoptive families represent some of the most advantaged families because of the screening and selection process that is required for a family to adopt a child; thus, PI children's better scores on some measures may reflect the high quality of their rearing environment. PI children who are adopted into USA families may be somewhat younger at adoption and less likely to have disabilities than children who go on to other environments (e.g., European adoption, Russian foster care), although their birth circumstances and developmental status are no different. While the most likely explanations for this PI sample's especially "good" scores are carry-over of conforming and obedient behaviors from institutional life, high quality of adoptive homes, or selective adoption of younger children, it remains possible that institutional rearing could influence young PI children's behavior in other ways. For instance, group rearing might give PI children experience in getting along with other children, managing conflict, and following group instructions that puts them at an advantage relative to parent-reared children. However, because there is limited scaffolding and support of children's developing skills in the institutional environment, institutionalized children are probably more likely to learn aggression and other maladaptive social behaviors.

It is less clear what may be contributing to the current sample's relatively good attachment and indiscriminate friendliness scores. One possibility is that the slightly older age of this sample (M = 36 months for AQ, 43 months for IF) relative to comparison samples (M = 30 months; Chisholm, 1998) contributed to higher scores; in fact, Chisholm (1998) found that attachment, but not indiscriminate friendliness, improved among Romanian adoptees between the 30 month and the 54 month assessments. However, because only one study to our knowledge has assessed parent-reared non-adopted children using these measures (Chisholm, 1998), further research is needed to confirm these findings.

While some children may go on to develop problems as they grow older (see Sleeper effects, below), it is likely that many children from this sample will not. If this is true, it echoes the findings from some non-institutional intervention studies in that quality of care only has substantial and lasting effects on a subset of children. In fact, even when faced with severe deprivation in an institution or an older age at adoption, only a portion of children go on to experience problems. This resilience can be partly attributed to individual differences in quality of care within institutions, with some children becoming a "favorite" of caregivers and thus receiving qualitatively better care (Smyke et al., 2007). It is also possible that the care environment prior to institutionalization or prenatal factors could confer advantages to some children who go on to experience institutionalization. But, most children enter institutional care very early in life, and prenatal factors like birth weight and prematurity have thus far not been found to be significant in accounting for individual differences in outcomes (Kreppner et al., 2007; Merz & McCall, 2010, 2011; Sonuga-Barke et al., 2008). Another likely factor in resilience is individual genetic differences; some children are genetically less sensitive to environmental effects (Caspi et al., 2003; National Scientific Council on the Developing Child, 2005), and these children may be less likely to suffer lasting negative effects of institutionalization (Rutter, 2003; Rutter et al., 2006; Van IJzendoorn et al., 2011). Thus, while some of the current study's findings of especially good functioning among PI children may be remnants of the institutional behavioral culture and not signs of positive adjustment, many children are expected to continue to demonstrate resiliency throughout childhood and adolescence due to both environmental and genetic factors.

5.1.2 Catch-up growth

Another potential factor contributing to the relatively modest intervention group differences in the current study is catch-up growth. When children are adopted into a supportive family, they typically experience massive catch-up growth in most domains (Van IJzendoorn et al., 2007; Van IJzendoorn & Juffer, 2006) due to the drastic improvement in their environment relative to an institution. Catch-up growth would likely be most pronounced among CNoI children, because the difference in quality of care between institution and adoptive family would be most drastic for this set of children. Thus, one possibility is that CNoI children are able to catch up to the level of intervention children in the years immediately following their adoption, and this would make intervention group differences fade. In fact, some have suggested that similar "fade out" findings in studies of effects of early childhood education are more accurately described as catch-up of non-intervention children (Barnett, 2011). Such effects seem most prominent when non-intervention children go on to enter relatively high quality settings (Magnuson et al., 2007). Adoptive families typically represent some of the most advantaged families, as they are screened and selected to be parents, tend to have higher resources, and have a strong desire for children. Thus, it is perhaps not surprising that CNoI children would show such impressive growth when they enter high quality adoptive homes.

Catch-up growth is likely to proceed at different rates for different domains of development and may also differ for individual children, depending on their degree of deficit at adoption, the quality of their home environment (including level of support for specific skills), and other factors. To date, however, the vast majority of research addressing catch-up growth is done cross-sectionally, or at relatively long intervals of time, rendering it difficult to identify exactly how long these catch-up processes are likely to take for children in various domains of

development. Assessing the relation between years in the adoptive home and scores on various outcome measures can provide one estimate of how a child's adjustment proceeds over time after they are adopted. In the current study, the findings for time in the adoptive home were mixed. While it was expected that better outcomes would be reported for children who had more time in their adoptive homes, this was true for attachment, but not other measures.

Children who had more time in their adoptive homes demonstrated more indiscriminately friendly behavior, poorer executive functioning, and more dysregulation than those who had less time in their adoptive homes. The finding for attachment is in line with expectations, as more time with an adoptive family would presumably increase the likelihood that a child would begin to develop a secure attachment relationship. For findings that are counter to our hypotheses, it is important to note that this sample of PI children, on average, is well within the range of normal behavior, and they are not experiencing elevated problem behaviors. It is possible that as children are adjusting to the new environment of American family life they become more active, uninhibited, and outgoing. The institutional behavioral culture that characterized their early care environment likely led them to present as exceptionally "easy going" and subdued, which might be associated with especially low, or "good", scores on measures of children's self-regulation and self-control. As children adjust to family life, they are likely to learn that their displays of emotion are responded to, and that they are able to effectively assert themselves by requesting things they like and protesting things they dislike. After more time with responsive caregivers, it is probable that assertions of will and displays of negative emotion might become more frequent. Further, indiscriminately friendly behavior is often reinforced by relatives and neighbors, and this may contribute to its persistence (and increase) over time. So, for PI children, catch-up might

be characterized by a relative increase in problems that, in most respects, actually reflects appropriate adjustment to American family life.

5.1.3 Sleeper effects

While the relative lack of problems among children in the current PI sample is impressive, it is not in line with previous research that suggests that many PI children do go on to experience higher rates of problems in many domains (MacLean, 2003). Previous studies from several independent samples including the larger sample from which the current subsample is drawn have observed that effects of age at adoption (i.e., effects of duration of exposure to institutional care) are more likely to be detected in adolescence than preschool and middle-childhood (e.g., Hawk & McCall, 2011; Merz and McCall, 2010; Rutter et al., 2010; Verhulst et al., 1990). Notably, previous research finds that these age at assessment differences are common in some domains of outcomes (e.g., behavior problems, executive function problems), but not others (e.g., attachment and indiscriminate friendliness; Julian, 2013). In the current study, when children were still relatively young, intervention effects were evident for attachment and indiscriminate friendliness. While some intervention effects were evident for behavior problems, this was not true for all behavior problem scales, and intervention effects on executive function were not yet apparent.

One possibility is that as this sample of children enters adolescence, more problems will begin to emerge, particularly in the domains of behavior problems and executive function problems. In other words, sleeper effects may become apparent, such that the effects of their early social-emotional deprivation only become clear relatively later in development. Because CNoI graduates experienced poorer early quality of care than intervention groups, it is

hypothesized that this group would be most likely to exhibit problems as they grow older. Thus, while intervention group differences were modest in early childhood, they may grow more distinct as this sample of children enters adolescence.

While one might expect intervention effects to be most prominent proximal to an intervention, sleeper effects have previously been detected for several other types of intervention programs (Magnuson et al., 2007; Reynolds & Robertson, 2003; Olds et al., 1997). It may be that institutional care (or an intervention, like the current one) affects changes in certain skills that are not evident until relatively later in development (Zeanah et al., 2011). It is possible that early social-emotional experience affects the way that the neural architecture of the brain develops, and the skills that are most affected by these neural circuits might not emerge until later in development. Another possibility is that the increased social and behavioral demands and expectations in adolescence provide a challenge to PI youth that make their deficits more apparent. Thus, the current PI sample will need to continue to be followed in order to determine whether their positive outcomes in early childhood continue as they grow older, or if sleeper effects emerge as they enter adolescence.

5.2 AGE AT ADOPTION AND INTERACTION EFFECTS

Previous research consistently finds that children adopted at a relatively older age tend to have higher rates of problems than those adopted earlier (Julian, 2013; MacLean, 2003). Overall, the findings of this study were in line with previous research, with an older age at adoption being associated with lower attachment security, more overall behavior problems, externalizing problems, internalizing problems, and dysregulation.

This study was unique in that age at adoption was examined together with differences in early care quality with each intervention condition. While some effects were in the expected direction, with more exposure to intervention conditions associated with better attachment security (T+SC only) and fewer externalizing (TO only) and internalizing (TO only) problems, the effects for executive function and competence were counter to hypotheses. Thus, while more time in an institutional environment is associated with higher risk for a variety of problems, when the institutional environment is characterized by higher quality social-emotional care, the risk for attachment problems at later ages of adoption may be lower. But, older ages at adoption following qualitatively better care within an institution might be associated with higher risk for problems in executive function and lower competence. Keeping in mind that these findings reflect differences within the normal range of behavior, it is possible that these "poorer" scores in part reflect the goals of the intervention to follow children's lead, and encourage independence and creativity (e.g., not conforming and obedient behavior). However, because these findings run counter to our hypotheses and were small in magnitude, it will be important for future studies to replicate these findings to ensure that they were not simply chance findings.

5.3 SUMMARY AND IMPLICATIONS

The purpose of the BH intervention was to improve children's social-emotional care and caregiver-child relationships within the institution, and this was thought to provide a context that would promote resident children's development in many domains. Specifically, caregiver training (in TO and T+SC) helped caregivers to take advantage of everyday opportunities to interact with resident children in sensitive and responsive ways. This is thought to facilitate the development of relationships between caregivers and children, and eliminate the sometimes

harsh "ready or not" approach to caretaking that is prevalent in CNoI BHs. Children in T+SC also experienced much greater consistency in caregivers, and the elimination of graduations provided more stability in their peers as well. Seeing the same children and caregivers from day to day produced an environment where relationships (caregiver-child and child-child) were more likely to develop. Further, having groups mixed by age and disability status facilitated caregivers' ability to split their attention between children more effectively (e.g., not all children would need to be fed by a caregiver at meal time). The combination of these changes to the BH environment produced a more stimulating environment for resident children, and made it more likely that caregivers would appropriately scaffold resident children's cognitive, social, behavioral, and physical development. The increased predictability and sensitivity of caregivers produced a less stressful environment than in CNoI, which made it less likely that intervention graduates would experience lasting effects of early toxic stress.

While children were still residing in the orphanage, there were clear differences between all three intervention groups with respect to attachment; social, communication, and motor development; and physical growth (St. Petersburg-USA Orphanage Research Team, 2008). In the current study, children were assessed after adoption and overall group differences were in line with expectations, with children who had enhanced social-emotional care within the institution having better outcomes than CNoI children in most domains in which differences were detected. However, the effects were small, and some effects were only present for either T+SC or TO relative to CNoI. The small magnitude of effects is likely to be partially due to small sample sizes; resilience and catch-up growth, particularly among CNoI graduates; the likelihood that problems occur in only some children; and potential sleeper effects. Thus, benefits of the intervention seem to persist after children are adopted into high-quality,

supportive adoptive homes, but group differences are less pronounced than one might expect. It was hypothesized that intervention group might interact with age at adoption, such that more time in an intervention BH might have a different effect on children than more time in a traditional "care as usual" BH (CNoI). But, these effects were less clear, with some effects running counter to hypotheses.

The best environment for rearing children is in a loving, caring, stable family, but for practical, financial, and cultural reasons, institutions will continue to exist. This study demonstrated that when institutions are improved to become more family-like, children reap benefits that can last after they are adopted into families. Although intervention effects are modest at these young ages, prior research suggests that problems typically emerge for PI youth as they enter adolescence. It is possible that as our current sample of children continues to develop, the intervention groups will diverge with those who had experienced the poorest early care environment (CNoI) likely to demonstrate the highest rates of problems.

5.4 LIMITATIONS

This is the first study to examine the effects of a comprehensive social-emotional intervention within an orphanage institution using regular institutional staff on the development of children after they have been adopted. This study utilized parent-report questionnaire measures to assess children's outcomes. While questionnaire measures facilitate data collection from a large number of families, they lack the more nuanced observations and conclusions that might come from more in-depth observational measures. Parent-report questionnaires were chosen because parents

have the advantage of observing their children across many settings, but parents' responses depend on their own perceptions and standards, which vary between parents.

The primary limitations of this study relate to the nature of the study as a natural experiment. As is uniformly true of the entire PI literature, the experimenters had no control over which children were sent to which institutions, the care they received prior to admission into an institution, the developmental status of children upon entry to the institution, when each child was ultimately adopted, or the quality of their care after adoption. Further, while this set of institutions is the most empirically described in the literature (The St. Petersburg-USA Orphanage Research Team, 2005, 2008), data are not available with regard to a *specific child's* quality of care within the institution; instead, quality of care is generalized from what is typical in a given institution. To maximize the likelihood that the interventions would be faithfully implemented by the administration and staff of each BH, intervention conditions (T+SC, TO, NoI) were assigned based on each BH director's preferences rather than randomly assigned. But, any differences between BHs at baseline did not clearly favor one versus another BH (The St. Petersburg-USA Orphanage Research Team, 2008), and the interventions were maintained for at least 6 years after implementation (McCall et al., 2013). In addition, sample size is inherently limited by the number of children who are adopted from each BH that was a part of this study.

While these factors introduce variability into the data over and above any effects of the interventions, they also reflect the real-world conditions of orphanages and orphanage interventions around the world. Scientifically, these factors may "muddy the waters" and make effects more difficult to detect, but if effects can be detected despite these challenges, it suggests that the intervention, once scaled, is likely to have significant and meaningful effects as well.

5.5 FUTURE DIRECTIONS

The findings of this study suggest several directions for future research. First, it will be important to continue to follow this sample of children into adolescence and beyond. Prior research suggests the possibility of sleeper effects, with more problems emerging among some children as they enter the adolescent years. Future studies will be necessary to determine whether children in this study are well adjusted and resilient, or are a few years away from experiencing problems related to their early experience. Future studies should also more closely follow children in the years immediately after adoption to help us to understand the process of catch-up growth over time. This will be important for children coming from typical institutions as well as those who have experienced enhanced social-emotional care while they were in residence. These studies will be important to help us to determine what produces the diminished intervention group differences after adoption relative to when children were still in residence. Specifically, such studies would help identify whether "care as usual" children are catching up to the level of intervention children, or whether intervention children struggle with their entry into adoptive homes and fall behind in their development. Most importantly, however, the results of this study show promise for the effects of comprehensive social-emotional interventions in institutions. Practitioners and policy makers should continue their efforts to improve caregiver-child relationships within institutions, and to make institutions more family-like environments for resident children.

BIBLIOGRAPHY

Achenbach, T. M., Phares, V., Howell, C. T., Rauh, V. A., & Nurcombe, B. (1990). Seven-year outcome of the Vermont intervention program for low-birthweight infants. *Child Development*, *61*, 1672–1681.

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, and Families.

Bakermans-Kranenburg, M. J., Steele, H., Zeanah, C. H., Muhamedrahimov, R. J., Vorria, P., Dobrova-Krol, N. A., … Gunnar, M. R. (2011). III. Attachment and emotional development in institutional care: Characteristics and catch up. *Monographs of the Society for Research in Child Development*, *76*(4), 62–91. doi:10.1111/j.1540-5834.2011.00628.x

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, *129*(2), 195–215. doi:10.1037/0033-2909.129.2.195

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2008). Earlier is better: A meta-analysis of 70 years of intervention improving cognitive development in institutionalized children. *Monographs of the Society for Research in Child Development*, *73*(3), 279–293. doi:10.1111/j.1540-5834.2008.00498.x

Barnett, W. S. (2011). Effectiveness of early educational intervention. *Science*, *333*(6045), 975–978. doi:10.1126/science.1204534

Beckett, C., Bredenkamp, D., Castle, J., Groothues, C., O'Connor, T. G., Rutter, M., & The English and Romanian Adoptees Study Team. (2002). Behavior patterns associated with institutional deprivation: A study of children adopted from Romania. *Journal of Developmental and Behavioral Pediatrics*, *23*(5), 297–303.

Blizzard, R. M. (1990). Psychosocial short stature. In F. Lifshitz (Ed.), *Pediatric endocrinology* (pp. 77–91). New York, NY: Marcel Dekker.

Bornstein, M. H., & Tamis-LeMonda, C. S. (1989). Maternal responsiveness and cognitive development in children. In M. H. Bornstein (Ed.), *Maternal responsiveness: Characteristics and consequences* (pp. 49–61). San Francisco: Jossey-Bass.

Bos, K., 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*, 1–16. doi:10.3389/neuro.08.016.2009

Bowlby, J. (1951). Maternal care and mental health. *Bulletin of the World Health Organization*, *3*, 355–534.

Bowlby, J. (1973). *Separation*. New York: Basic.

Bowlby, J. (1980). *Attachment and loss: Vol. 3. Loss*. New York: Basic.

Brossard, M., & Decarie, T. G. (1971). The effects of three kinds of perceptual-social stimulation on the development of institutionalized infants. *Early Child Development and Care*, *1*(1), 111–130. doi:10.1080/0300443710010109

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

Campbell, F. A., Ramey, C. T., Pungello, E., Sparling, J., & Miller-Johnson, S. (2002). Early childhood education : Young adult outcomes from the Abecedarian Project. *Applied Developmental Science*, *6*(1), 42–57.

Carlson, E. A. (1998). A prospective longitudinal study of attachment disorganization/disorientation. *Child Development*, *69*(4), 1107–1128.

Carlson, M., & Earls, F. (1997). Psychological and neuroendocrinological sequelae of early social deprivation in institutionalized children in Romania. *Annals of the New York Academy of Sciences*, *807*, 419–428. doi:10.1111/j.1749-6632.1997.tb51936.x

Carlson, S. M. (2009). Social origins of executive function development. In C. Lewis & J. I. M. Carpendale (Eds.), *Social interaction and the development of executive function. New Directions in Child and Adolescent Development, 123* (pp. 87–98). doi:10.1002/cd

Carter, A. S., & Briggs-Gowan, M. J. (2006). *Infant-Toddler Social and Emotional Assessment examiner's manual*. San Antonio, TX: Pearson.

Carter, A. S., Briggs-Gowan, M. J., Jones, S. M., & Little, T. D. (2003). The Infant-Toddler Social and Emotional Assessment (ITSEA): Factor structure, reliability, and validity. *Journal of Abnormal Child Psychology*, *31*(5), 495–514.

Casler, L. (1965). The effects of extra tactile stimulation on a group of institutionalized infants. *Genetic Psychology Monographs*, *71*, 137–175.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., … Poulton, R. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science*, *301*(5631), 386–389. doi:10.1126/science.1083968

Chisholm, K. (1996). *Attachment security and indiscriminately friendly behavior in children adopted from Romanian orphanages*. (Unpublished doctoral dissertation). Simon Fraser University, Burnaby, British Colombia, Canada.

Chisholm, K. (1998). A three year follow-up of attachment and indiscriminate friendliness in children adopted from Romanian orphanages. *Child Development*, *69*(4), 1092–1106.

Chisholm, K., Carter, M. C., Ames, E. W., & Morison, S. J. (1995). Attachment security and indiscriminately friendly behavior in children adopted from Romanian orphanages. *Development and Psychopathology*, *7*(2), 283–294. doi:10.1017/S0954579400006507

Clarke, A. M., & Clarke, A. D. B. (1976). *Early experience: Myth and evidence*. New York, NY: Free Press.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159.

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. doi:10.1177/0165025410371602

Colvert, E., Rutter, M., Beckett, C., Castle, J., Groothues, C., Hawkins, A., … Sonuga-Barke, E. J. S. (2008). Emotional difficulties in early adolescence following severe early deprivation: Findings from the English and Romanian adoptees study. *Development and Psychopathology*, *20*(2), 547–567. doi:10.1017/S0954579408000278

Colvert, E., Rutter, M., Kreppner, J. M., 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. doi:10.1007/s10802-008-9232-x

Dalen, M. (2001). School performances among internationally adopted children in Norway. *Adoption Quarterly*, *5*(2), 39–58.

Egeland, B., Weinfield, N. S., Bosquet, M., & Cheng, V. K. (2000). Remembering, repeating, and working through: Lessons from attachment-based interventions. In J. D. Osofsky & H. E. Fitzgerald (Eds.), *Handbook of infant mental health* (Volume 4., pp. 36–89). New York: John Wiley & Sons.

Eisenberg, N., Valiente, C., Spinrad, T. L., Cumberland, A., Liew, J., Reiser, M., … Losoya, S. H. (2009). Longitudinal relations of children's effortful control, impulsivity, and negative emotionality to their externalizing, internalizing, and co-occurring behavior problems. *Developmental Psychology*, *45*(4), 988–1008. doi:10.1037/a0016213

Fisher, L., Ames, E. W., Chisholm, K., & Savoie, L. (1997). Problems reported by parents of Romanian orphans adopted to British Columbia. *International Journal of Behavioral Development*, *20*(1), 67–82. doi:10.1080/016502597385441

Fraley, R. C., Roisman, G. I., & Haltigan, J. D. (2013). The legacy of early experiences in development: Formalizing alternative models of how early experiences are carried forward over time. *Developmental Psychology*, *49*(1), 109–126. doi:10.1037/a0027852

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2000). *The BRIEF professional manual*. Odessa, FL: Psychological Assessment Resources.

Groza, V. K., & Ryan, S. D. (2002). Pre-adoption stress and its association with child behavior in domestic special needs and international adoptions. *Psychoneuroendocrinology*, *27*(1-2), 181–197.

Gunnar, M. R. (2000). Early adversity and the development of stress reactivity and regulation. In C. A. Nelson (Ed.), *The Minnesota symposia on child psychology. Vol 31: The effects of early adversity on neurobehavioral development* (pp. 163–200).

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: MIT Press.

Gunnar, M. R., Fisher, P. A., & The Early Experience Stress and Prevention Network. (2006). Bringing basic research on early experience and stress neurobiology to bear on preventive interventions for neglected and maltreated children. *Development and Psychopathology*, *18*(3), 651–677.

Gunnar, M. R., Morison, S. J., Chisholm, K., & Schuder, M. (2001). Salivary cortisol levels in children adopted from Romanian orphanages. *Development and Psychopathology*, *13*(3), 611–628.

Gunnar, M. R., & Quevedo, K. (2007). The neurobiology of stress and development. *Annual Review of Psychology*, *58*, 145–173. doi:10.1146/annurev.psych.58.110405.085605

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

Hakimi-Manesh, Y., Mojdehi, H., & Tashakkori, A. (1984). Short communication: Effects of environmental enrichment on the mental and psychomotor development of orphanage

children. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *25*(4), 643–650.

Hawk, B., & McCall, R. B. (2011). Specific extreme behaviors of post-institutionalized Russian adoptees. *Developmental Psychology*. doi:10.1037/a0021108

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. doi:10.1080/10926755.2012.661331

Hawk, B., Wright, A. J., Julian, M. M., Rosas, J. M., Merz, E. C., & McCall, R. B. (2013). Potential selective responding in a parent questionnaire study of post-institutionalized children. *Adoption Quarterly*, *16*(2), 97–107. doi:10.1080/10926755.2013.787481

Hertsgaard, L., Gunnar, M. R., Erickson, M. F., & Nachmias, M. (1995). Adrenocortical responses to the strange situation in infants with disorganized/disoriented attachment relationships. *Child Development*, *66*(4), 1100–1106.

Hoksbergen, R. A. C. (1999). The importance of adoption for nurturing and enhancing the emotional and intellectual potential of children. *Adoption Quarterly*, *3*(2), 29–41.

Johnson, D. E., & Gunnar, M. R. (2011). IV. Growth failure in institutionalized children. *Monographs of the Society for Research in Child Development*, *76*(4), 92–126. doi:10.1111/j.1540-5834.2011.00629.x

Johnson, D. E., Miller, L. C., Iverson, S., Thomas, W., Franchino, B., Dole, K., … Hostetter, M. K. (1992). The health of children adopted from Romania. *The Journal of the American Medical Association*, *268*(24), 3446–3451.

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. doi:10.1111/j.1540-5834.2011.00627.x

Juffer, F., & van IJzendoorn, M. H. (2005). Behavior problems and mental health referrals of international adoptees: A meta-analysis. *Journal of the American Medical Association*, *293*(20), 2501–2515. doi:10.1001/jama.293.20.2501

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. doi: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*, *14*(3-4), 119–147.

Kersten-Alvarez, L. E., Hosman, C. M. H., Riksen-Walraven, J. M., Van Doesum, K. T. M., & Hoefnagels, C. (2010). Long-term effects of a home-visiting intervention for depressed mothers and their infants. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *51*(10), 1160–1170. doi:10.1111/j.1469-7610.2010.02268.x

Kertes, D. A., Gunnar, M. R., Madsen, N. J., & Long, J. D. (2008). Early deprivation and home basal cortisol levels: A study of internationally adopted children. *Development and Psychopathology*, *20*(2), 473–491. doi:10.1017/S0954579408000230

Kim, T. I., Shin, Y. H., & White-Traut, R. C. (2003). Multisensory intervention improves physical growth and illness rates in Korean orphaned newborn infants. *Research in Nursing & Health*, *26*(6), 424–433. doi:10.1002/nur.10105

Kreppner, J. M., Rutter, M., Beckett, C., Castle, J., Colvert, E., Groothues, C., … Sonuga-Barke, E. J. S. (2007). Normality and impairment following profound early institutional deprivation: A longitudinal follow-up into early adolescence. *Developmental Psychology*, *43*(4), 931–946. doi:10.1037/0012-1649.43.4.931

Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology*, *42*(4), 627–642. doi:10.1037/0012-1649.42.4.627

Levin, K., & Haines, S. (2007). Opportunities for the development of communicative competence for children in an orphanage in South Africa. *Child Care in Practice*, *13*(3), 221–236. doi:10.1080/13575270701353564

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

Magnuson, K. A., Ruhm, C., & Waldfogel, J. (2007). The persistence of preschool effects: Do subsequent classroom experiences matter? *Early Childhood Research Quarterly*, *22*(1), 18–38. doi:10.1016/j.ecresq.2006.10.002

Mahone, E. M., & Hoffman, J. (2007). Behavior ratings of executive function among preschoolers with ADHD. *The Clinical Neuropsychologist*, *21*(4), 569–586. doi:10.1080/13854040600762724

Marcovitch, S., Goldberg, S., Gold, A., Washington, J., Wasson, C., Krekewich, K., & Handley-Derry, M. (1997). Determinants of behavioural problems in Romanian children adopted in Ontario. *International Journal of Behavioral Development*, *20*(1), 17–31. doi:10.1080/016502597385414

Maurer, D., Mondloch, C. J., & Lewis, T. L. (2007). Sleeper effects. *Developmental Science*, *10*(1), 40–47. doi:10.1111/j.1467-7687.2007.00562.x

McCall, R. B., Groark, C. J., Fish, L., Harkins, D., Serrano, G., & Gordon, K. (2010). A socioemotional intervention in a Latin American orphanage. *Infant Mental Health Journal*, *31*(5), 521–542. doi:10.1002/imhj.20270

McCall, R. B., Groark, C. J., Fish, L., Muhamedrahimov, R. J., Palmov, O. I., & Nikiforova, N. V. (2013). Maintaining a social-emotional intervention and its benefits for institutionalized children. *Child Development*, *84*(5), 1734–49. doi:10.1111/cdev.12098

McCarton, C. M., Brooks-Gunn, J., Wallace, I. F., Bauer, C. R., Bennett, F. C., Bernbaum, J. C., … the Infant Health and Development Program Research Group. (1997). Results at Age 8 years of early intervention for low-birth-weight premature infants. *Journal of the American Medical Association*, *277*(2), 126–132. doi:10.1097/00006254-199706000-00008

Mersky, J. P., Topitzes, J. D., & Reynolds, A. J. (2011). Maltreatment prevention through early childhood intervention: A confirmatory evaluation of the Chicago Child–Parent Center preschool program. *Children and Youth Services Review*, *33*(8), 1454–1463. doi:10.1016/j.childyouth.2011.04.022

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. doi: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. doi:10.1111/j.1469-7610.2010.02335.x

National Scientific Council on the Developing Child. (2005). *Excessive Stress Disrupts the Architecture of the Developing Brain: Working Paper #3*. *http://www.developingchild.net*.

National Scientific Council on the Developing Child. (2010). *Persistent fear and anxiety can affect young children's learning and development: Working paper #9*. *http://www.developingchild.net*.

National Scientific Council on the Developing Child. (2011). *Building the brain's "air traffic control" system: How early experiences shape the development of executive function: Working paper #11*. *http://www.developingchild.net*.

National Scientific Council on the Developing Child. (2012). *The science of neglect: The persistent absence of responsive care disrupts the developing brain: Working paper #12*. *http://www.developingchild.net*.

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. doi:10.1126/science.1143921

NICHD Early Chid Care Research Network. (2001). Child care and children's peer interaction at 24 and 36 months: The NICHD Study of Early Child Care. *Child Development*, *72*(5), 1478–1500. doi:10.1111/1467-8624.00361

O'Connor, T. G., Marvin, R. S., Rutter, M., Olrick, J. T., Britner, P. A., & The English and Romanian Adoptees Study Team. (2003). Child-parent attachment following early institutional deprivation. *Development and Psychopathology*, *15*(1), 19–38.

O'Connor, T. G., Rutter, M., & The English and Romanian Adoptees Study Team. (2000). Attachment disorder behavior following early severe deprivation: Extension and longitudinal follow-up. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*(6), 703–712. doi:10.1097/00004583-200006000-00008

Olds, D. L., Eckenrode, J., Henderson, C. R., Kitzman, H., Powers, J., Cole, R., … Luckey, D. W. (1997). Long-term effects of home visitation on maternal life course and child abuse and neglect: Fifteen-year follow-up of a randomized trial. *Journal of the American Medical Association*, *278*(8), 637–643.

Olds, D. L., Henderson, C. R., Cole, R., Eckenrode, J., Kitzman, H., Luckey, D., … Powers, J. (1998). Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. *Journal of the American Medical Association*, *280*(14), 1238–1244. doi:10.1001/jama.280.14.1238

Reynolds, A. J., & Robertson, D. L. (2003). School-based early intervention and later child maltreatment in the Chicago Longitudinal Study. *Child Development*, *74*(1), 3–26.

Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2001). Long-term effects of an early childhood intervention on educational achievement: A 15-year follow-up of low-income children in public schools. *Journal of the American Medical Association*, *285*(18), 2339–2347.

Rheingold, H. L. (1956). The modification of social responsiveness in institutional babies. *Monographs of the Society for Research in Child Development*, *21*(2), 1–48.

Riksen-Walraven, J. M., & van Aken, M. A. G. (1997). Effects of two mother-infant intervention programs upon children's development at 7, 10, and 12 years. In W. Koops, J. B. Hoeksma, & D. C. Van Den Boom (Eds.), *Development of interaction and attachment: Traditional and non-traditional approaches1* (pp. 79–91). North-Holland: Amsterdam.

Roisman, G. I., & Fraley, R. C. (2013). Developmental Mechanisms Underlying the Legacy of Childhood Experiences. *Child Development Perspectives*, *7*(3), 149-154. doi:10.1111/cdep.12030

Rosas, J. M., & McCall, R. B. (2011). Characteristics of institutions, interventions, and resident children's development. Unpublished manuscript, authors. Pittsburgh, PA: University of Pittsburgh Office of Child Development.

Rothbart, M. K., Ahadi, S. A., Hershey, K. A., & Fisher, P. A. (2001). Investigation of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development*, *72*(5), 1394–1408.

Rutter, M. (2003). Genetic influences on risk and protection: Implications for understanding resilience. In S. S. Luthar (Ed.), *Resilience and vulnerability: Adaptation in the context of childhood adversities* (pp. 489–509). New York: Cambridge University Press.

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. doi:10.1192/bjp.179.2.97

Rutter, M., Moffitt, T. E., & Caspi, A. (2006). Gene-environment interplay and psychopathology: Multiple varieties but real effects. *Journal of Child Psychology and Psychiatry*, *47*(3-4), 226–261. doi:10.1111/j.1469-7610.2005.01557.x

Rutter, M., O'Connor, T. G., & The English and Romanian Adoptees Study Team. (2004). Are there biological programming effects for psychological development? Findings from a study of Romanian adoptees. *Developmental Psychology*, *40*(1), 81–94. doi:10.1037/0012-1649.40.1.81

Rutter, M., Sonuga-Barke, E. J. S., Beckett, C., Castle, J., Kreppner, J. M., Kumsta, R., … Bell, C. A. (2010). Deprivation-Specific Psychological Patterns: Effects of Institutional Deprivation. *Monographs of the Society for Research in Child Development*, *75*(1), vii–ix, 1–252.

Rutter, M., & The English and Romanian Adoptees Study Team. (1998). Developmental catch-up, and deficit, following adoption after severe global early privation. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *39*(4), 465–476.

Saltz, R. (1973). Effects of part-time "mothering" on IQ and SQ of young institutionalized children. *Child Development*, *44*(1), 166–170.

Sayegh, Y., & Dennis, W. (1965). The effect of supplementary experiences upon the behavioral development of infants in institutions. *Child Development*, *36*(1), 81–90.

Schweinhart, L. J., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C. R., & Nores, M. (2005). Lifetime effects: The High/Scope Perry Preschool Study through age 40. *Monographs of the HighScope Educational Research Foundation, 14*. Ypsilanti, MI: HighScope Press.

Sherman, E. M. S., & Brooks, B. L. (2010). Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P): Test review and clinical guidelines for use. *Child Neuropsychology*, *16*(5), 503–519. doi:10.1080/09297041003679344

Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion

and disease prevention. *The Journal of the American Medical Association*, *301*(21), 2252–2259. doi:10.1001/jama.2009.754

Simpson, J. A., Griskevicius, V., Kuo, S. I.-C., Sung, S., & Collins, W. A. (2012). Evolution, stress, and sensitive periods: The influence of unpredictability in early versus late childhood on sex and risky behavior. *Developmental Psychology*, *48*(3), 674–686. doi:10.1037/a0027293

Skeels, H. M. (1966). Adult status of children with contrasting early life experiences: A follow-up study. *Monographs of the Society for Research in Child Development*, *31*(3), 1–65.

Skeels, H. M., & Dye, H. B. (1944). A study of the effects of differential stimulation on mentally retarded children. *Proceedings and Addresses of the American Association on Mental Deficiency*, *114-136*(44).

Smyke, A. T., Dumitrescu, A., & Zeanah, C. H. (2002). Attachment disturbances in young children. I: The continuum of caretaking casualty. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(8), 972–982. doi:10.1097/00004583-200208000-00016

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. doi:10.1111/j.1469-7610.2006.01694.x

Smyke, A. T., Zeanah, C. H., Fox, N. A., Nelson, C. A., & Guthrie, D. (2010). Placement in foster care enhances quality of attachment among young institutionalized children. *Child Development*, *81*(1), 212–223. doi:10.1111/j.1467-8624.2009.01390.x

Smyke, A. T., Zeanah, C. H., Gleason, M. M., Drury, S. S., Fox, N. A., Nelson, C. A., & Guthrie, D. (2012). A randomized controlled trial comparing foster care and institutional care for children with signs of reactive attachment disorder. *American Journal of Psychiatry*, *169*(5), 508–514.

Sonuga-Barke, E. J. S., Beckett, C., Kreppner, J. M., Castle, J., Colvert, E., Stevens, S. E., … Rutter, M. (2008). Is sub-nutrition necessary for a poor outcome following early institutional deprivation? *Developmental Medicine and Child Neurology*, *50*(9), 664–671. doi:10.1111/j.1469-8749.2008.03065.x

Sroufe, L. A. (1996). *Emotional development: The organization of emotional life in the early years*. Cambridge: Cambridge University Press.

Sroufe, L. A., Egeland, B., & Kreutzer, T. (1990). The fate of early experience following developmental change: longitudinal approaches to individual adaptation in childhood. *Child Development*, *61*(5), 1363–1373. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2245730

Sroufe, L. A., & Waters, E. (1977). Attachment as an organizational construct. *Child Development*, *48*(4), 1184–1199. doi:10.2307/1128475

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.

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. doi:10.1007/s10802-007-9185-5

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. doi:10.1016/j.appdev.2005.12.004

Tan, T. X., Marfo, K., & Dedrick, R. F. (2007). Special needs adoption from China: Exploring child-level indicators, adoptive family characteristics, and correlates of behavioral adjustment. *Children and Youth Services Review*, *29*(10), 1269–1285. doi:10.1016/j.childyouth.2007.05.001

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. doi:10.1016/j.appdev.2010.04.002

Taneja, V., Beri, R. S., & Puliyel, J. M. (2004). Play in orphanages. *Indian Journal of Pediatrics*, *71*(4), 297–299.

Taneja, V., Sriram, S., Beri, R. S., Sreenivas, V., Aggarwal, R., Kaur, R., & Puliyel, J. M. (2002). "Not by bread alone": Impact of a structured 90-minute play session on development of children in an orphanage. *Child: Care, Health and Development*, *28*(1), 95–100.

The St. Petersburg-USA Orphanage Research Team. (2005). Characteristics of children, caregivers, and orphanages for young children in St. Petersburg, Russian Federation. *Journal of Applied Developmental Psychology*, *26*(5), 477–506. doi:10.1016/j.appdev.2005.06.002

The St. Petersburg-USA Orphanage Research Team. (2008). The effects of early social-emotional and relationship experience on the development of young orphanage children. *Monographs of the Society for Research in Child Development*, *73*(3), vii–viii, 1–297.

Tottenham, N., Hare, T. A., Quinn, B. T., McCarry, T. W., Nurse, M., Gilhooly, T., … Casey, B. J. (2010). Prolonged institutional rearing is associated with atypically large amygdala volume and difficulties in emotion regulation. *Developmental Science*, *13*(1), 46–61. doi:10.1111/j.1467-7687.2009.00852.x

U.S. Department of Health and Human Services. (2002). Making a Difference in the Lives of Infants, Toddlers and Their Families: The Impacts of Early Head Start. Princeton, NJ: Mathematica Policy Research, Inc.

U.S. Department of Health and Human Services. (2010). Head Start impact study. Final report. Washington, DC.

UNICEF. (2009). *Progress for Children: A report Card on Child Protection*. New York, NY.

Van den Boom, D. C. (1995). Do first-year intervention effects endure? Follow-up during toddlerhood of a sample of Dutch irritable infants. *Child Development*, *66*(6), 1798–1816.

Van den Dries, L., Juffer, F., van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2009). Fostering security? A meta-analysis of attachment in adopted children. *Children and Youth Services Review*, *31*(3), 410–421. doi:10.1016/j.childyouth.2008.09.008

Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Juffer, F. (2007). Plasticity of growth in height, weight, and head circumference: Meta-analytic evidence of massive catch-up after international adoption. *Journal of Developmental and Behavioral Pediatrics*, *28*(4), 334–343. doi:10.1097/DBP.0b013e31811320aa

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. doi:10.1111/j.1469-7610.2006.01675.x

Van IJzendoorn, M. H., Juffer, F., & Duyvesteyn, M. G. C. (1995). Breaking the intergenerational cycle of insecure attachment: A review of the effects of attachment-based interventions on maternal sensitivity and infant security. *Journal of Child*, *36*(2), 225–248.

Van IJzendoorn, M. H., Juffer, F., & Poelhuis, C. W. K. (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. doi:10.1037/0033-2909.131.2.301

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. doi:10.1111/j.1540-5834.2011.00626.x

Van IJzendoorn, M. H., Schuengel, C., & Bakermans-Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology*, *11*(2), 225–249.

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

Verhulst, F. C., Althaus, M., & Versluis-Den Bieman, H. J. M. (1990). Problem behavior in international adoptees: II. Age at placement. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*(1), 104–111.

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.

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.

Waters, E., & Deane, K. E. (1985). Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behavior in infancy and early childhood. *Monographs of the Society for Research in Child Development*, *50*(1/2), 41–65.

Wolff, P. H., Dawit, Y., & Zere, B. (1995). The Solomuna orphanage: A historical survey. *Social Science & Medicine*, *40*(8), 1133–1139.

Wolff, P. H., & Fesseha, G. (1999). The orphans of Eritrea: A five-year follow-up study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *40*(8), 1231–1237.

Wolff, P. H., Tesfai, B., Egasso, H., & Aradomt, T. (1995). The Orphans of Eritrea: A Comparison Study. *Journal of Child Psychology and Psychiatry*, *36*(4), 633–644. doi:10.1111/j.1469-7610.1995.tb01315.x

Zeanah, C. H. (2000). Disturbances of attachment in young children adopted from institutions. *Developmental and Behavioral Pediatrics*, *21*(3), 230–236.

Zeanah, C. H., Gunnar, M. R., McCall, R. B., Kreppner, J. M., & Fox, N. A. (2011). VI. Sensitive Periods. *Monographs of the Society for Research in Child Development*, *76*(4), 147–162. doi:10.1111/j.1540-5834.2011.00631.x

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*(4), 885–907.

Zeanah, C. H., Smyke, A. T., Koga, S. F., Carlson, E. A., & The Bucharest Early Intervention Project Core Group. (2005). Attachment in institutionalized and community children in Romania. *Child Development*, *76*(5), 1015–1028. doi:10.1111/j.1467-8624.2005.00894.x