

## Placement in Foster Care Enhances Quality of Attachment Among Young Institutionalized Children

Anna T. Smyke and  
Charles H. Zeanah

*Tulane University School of Medicine*

Charles A. Nelson

*Harvard Medical School/Children's  
Hospital Boston*

Nathan A. Fox

*University of Maryland*

Donald Guthrie

*University of California Los Angeles*

This study examined classifications of attachment in 42-month-old Romanian children ( $N = 169$ ). Institutionalized since birth, children were assessed comprehensively, randomly assigned to care as usual (CAU) or to foster care, and compared to family-reared children. Attachment classifications for children in foster care were markedly different from those in the CAU. Importantly, children placed in foster care before 24 months were more likely to have secure attachments and if placed earlier were less likely to have disorganized or insecure-other attachments. Cognitive status predicted greater likelihood of organized attachment in the CAU and greater likelihood of secure attachment in the foster care and never-institutionalized groups. Foster care is an important intervention to reduce the adverse effects following early deprivation.

Attachment theory implies that the formation of a preferred attachment between infant and parent reflects the activity of “experience expectant” neural systems (Greenough, Black, & Wallace, 1987). Specifically, our species has evolved in such a way as to expect that infants will be cared for by a capable caregiver, one who can ensure survival. Accordingly, only in the most extreme conditions of rearing do attachments fail to develop, such as in children who have been severely neglected (Boris et al., 2004; Zeanah et al., 2004) or in those raised in institutional settings (Smyke, Dumitrescu, & Zeanah, 2002; Tizard & Rees, 1975; Zeanah, Smyke, Koga, Carlson, & the BEIP Core Group, 2005). In both instances, the young child’s ability to form selective attachments is limited by aberrant environmental conditions. Even in these atypical settings, however, attachment to a preferred caregiver seems often to occur, indicating

a “hard-wired” propensity for the young child to become attached.

On the other hand, the type or quality of attachments a young child forms seems to reflect neural processes that are “experience dependent” (Greenough et al., 1987). That is, attachment theory posits that the young child constructs attachment relationships that reflect the child’s experiences with particular caregivers. Quality of attachment is typically assessed by using the Strange Situation procedure (SSP; Ainsworth, Blehar, Waters, & Wall, 1978) that examines individual differences in the organization of attachment and exploratory behaviors. As a child forms an attachment to an adult caregiver, experiences with that adult seem to relate to the type or quality of that attachment. This model is supported by various lines of evidence about quality of attachment.

In addition to the fact that children may develop different types of attachments to different caregivers, a large number of studies have linked parental characteristics to infant attachment, including parents’ sensitive behavior toward the infant, state of mind with regard to attachment, insightfulness, and reflective functioning (De Wolff & van IJzendoorn,

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Correspondence concerning this article should be addressed to Anna T. Smyke, Department of Psychiatry/Neurology, Tulane University Health Sciences Center, 1440 Canal Street – TB-52, New Orleans, LA 70112. Electronic mail may be sent to [asmyme@tulane.edu](mailto:asmyme@tulane.edu).

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1997; Koren-Karie, Oppenheim, & Doley, 2002; Slade, Sadler, & Mayes, 2005; van IJzendoorn, 1995).

Nevertheless, the strongest evidence to date demonstrating that the specific quality of the child's attachment depends upon parental characteristics comes from various interventions in which changing parents' behaviors or their states of mind have led to changes in the quality of attachment of the child to that caregiver. These interventions have included impoverished mothers and infants (Heinicke, Fineman, & Ruth, 1999), mothers and their temperamentally difficult (van den Boom, 1994) or highly reactive (Klein Velderman, Bakermans-Kranenburg, & Juffer, 2006) infants, maltreated infants and their mothers (Cicchetti, Rogosch, & Toth, 2006; Toth, Maughan, & Manly, 2002), and foster mothers and their infants (Dozier, Grasso, & Lindhiem, 2007; Fisher & Kim, 2007). Impressively, these studies have shown uniformly better quality of attachments between infants and caregivers in intervention rather than endangered or stressed control groups.

There is also evidence about the ability of infants and toddler raised in institutional settings to recover from their early adversity and form healthy attachments. Some of the young children being raised in institutions have no attachments to their institutional caregivers (Smyke et al., 2002; Tizard & Rees, 1975; Zeanah et al., 2005), and a majority have compromised attachments, as reflected by the prevalence of disorganized and other atypical classifications of attachment (Vorria et al., 2003; Zeanah et al., 2005).

An early descriptive study that followed children after they had been removed from an institution and placed in foster care was conducted by Goldfarb (1943). He described 10- to 14-year-old children who had lived in institutions for their first 3 years of life as withdrawn and removed from their foster parents and caseworkers. He concluded that children who had been institutionalized in the early years of life could not form attachments.

A subsequent study with improved methodology reached a different conclusion. Tizard and her colleagues (Hodges & Tizard, 1989; Tizard & Hodges, 1978; Tizard & Rees, 1974, 1975) studied 65 children abandoned at birth due to poverty and placed in residential nurseries in London. Between ages 2 and 4 years, 15 of the children were returned to their biological parents, 24 were adopted, and 26 were still being reared in the residential nurseries. At age 4 years, the children were evaluated. Although the majority of the 26 children who remained in institutions at age 4 years showed seri-

ous disturbances of attachment, this was not true for either the adopted or the returned groups. In fact, 80% of the adoptive parents reported that their children had become attached to them within 1 year, and the majority reported that the children were deeply attached. Nevertheless, even in the adoptive group, which had a more favorable outcome than the other two groups across all measures and ages studied, some children displayed signs of indiscriminate behavior, that is, lack of reticence about approaching, interacting with, and going off with a stranger. None of the comparison group of children who had never been institutionalized showed indiscriminate behavior. Thus, Tizard's findings suggested more plasticity in attachment than Goldfarb (1943) had believed possible.

MacLean (2003) has pointed out correctly that one reason for the discrepancy may be that the children Goldfarb (1943) studied experienced more severe privation than the children Tizard and her colleagues (Hodges & Tizard, 1989; Tizard & Hodges, 1978; Tizard & Rees, 1974, 1975) studied. This was reflected both in descriptions of the institutional caregiving practices and in the IQs of the two groups. The children in the Tizard study who lived in residential nurseries had IQs in the average range, whereas the children in the Goldfarb study were delayed in all domains. Nevertheless, the main problem with these studies is that the measures of attachment they used were neither standardized nor derived from behavioral observations. More recent studies have addressed these shortcomings by studying attachment in preschool children.

Marcovitch et al. (1997) compared fifty-six 3- to 5-year-old Canadian children who had been adopted out of Romanian institutions before 6 months of age to those who had been adopted after 6 months of age, as well as a group of never-institutionalized Canadian comparison children. They found that secure attachment was observed less often (30%) controlling/insecure-other more often (42%).

Chisholm (1998) studied children adopted into Canada after having spent at least 8 months in a Romanian institution ( $n = 46$ ), children adopted into Canada from Romania at  $< 4$  months of age ( $n = 30$ ), and a Canadian-born comparison group matched on age and sex to the first group ( $n = 46$ ). Attachment at 39 months postadoption was assessed with a home-based version of the SSP and coded with the Preschool Assessment of Attachment (Crittenden, 1992). Children who had spent 8 months or more in institutions were less likely to

be securely attached than the other two groups of children, 37% versus 66% of those adopted after 4 months or less versus 58% of the Canadian children. In addition, there were more atypical insecure attachments in the group who had spent 8 months or more in institutions, 32.6% versus 3.7% of the < 4 months group and 6.9% of the Canadian children.

O'Connor, Marvin, Rutter, Olrick, and Britner (2003) studied attachment, using a within-the-home SSP in 111 four-year-old children adopted out of Romanian institutions into the United Kingdom and compared them to 52 nonmaltreated children adopted within the United Kingdom at < 6 months of age. They found that 55.1% of the children adopted within the United Kingdom were securely attached, with 4.1% disorganized-controlling and 16.3% insecure-other. In contrast, the Romanian children adopted out of institutions prior to 6 months of age were 41% secure, 9.8% disorganized-controlling, and 38.5% insecure-other. Of the children adopted after 6 months from institutions, only 33.3% were secure, whereas 7.7% were disorganized-controlling and 51.7% were insecure-other.

Taken together, these results indicate that children do form attachments following early deprivation, but subsequent attachment relationships are less likely to be secure and more likely to be atypical (disorganized-controlling or insecure-other). Organized insecure patterns of attachment (avoidant, ambivalent, and dependent) do not appear to be increased in children with institutional rearing.

Adoption studies such as these, informative as they are, also have limitations. These studies include only children who were selected intentionally rather than randomly, and they involve changes for the child not only from institutional care to family care but also changes in spoken language and culture.

In part to address these limitations, we initiated the Bucharest Early Intervention Project (BEIP; Zeanah et al., 2003). This is the first-ever randomized controlled trial of foster care as an alternative to institutional care. The BEIP was begun in the fall of 2000, involving 136 children living in institutions in Bucharest, Romania. They were recruited between the ages of 6 and 31 months, assessed comprehensively, and then assigned at random to foster care or to continued institutional care. They were reassessed at 30, 42, and 54 months of age, and the children in foster care were compared to children who received continued institutional care and to a group of never-institutionalized children who were recruited from pediatric clinics and living with their

families. In this report, we report on differences in attachment in the children at 42 months.

Specifically, we examined the following questions. Did placement of young children being raised in institutions into families increase security of attachment and decrease atypical patterns of attachment at 42 months of age compared to children who received ongoing institutional care? Did age at placement in foster care affect the likelihood of children developing secure or organized attachments at 42 months of age? Did factors such as gender, ethnicity, developmental quotient (DQ), or age at placement moderate the effects of intervention on security or organization of attachment?

## Method

### *Participants*

Three groups of children participated in this study. They were all participants in the BEIP, a longitudinal study aimed at examining recovery from early deprivation (Zeanah et al., 2003) through placement in foster care as an intervention to address the effects of early institutionalization. All of the children < 31 months of age who were cared for in the six institutional settings in Bucharest, Romania at the beginning of the study ( $n = 187$ ) were assessed for participation in the BEIP. Exclusion criteria for the study included medical conditions such as genetic syndromes, signs of fetal alcohol syndrome, and microcephaly. A total of 51 children were excluded from the study. The sample consisted of children ( $n = 136$ ) who had been abandoned very early in their lives and placed in institutions. After extensive baseline assessments (see Smyke et al., 2007, for a full description), the 136 institutionalized children were randomized into the continued care as usual including institutionalization group (care as usual group [CAUG];  $n = 68$ ) or to the BEIP foster care group (FCG;  $n = 68$ ). Randomization was accomplished by assigning a number to each of the 136 study children. These numbers (1–136) were placed in a hat and then drawn at random from the hat. The first number drawn was assigned to the CAUG and the second number was assigned to the FCG, with this pattern repeated until all 136 numbers had been drawn. There were two sets of twins in the study. The twins' numbers were placed on the same piece of paper and each set of twins was placed together.

A third group of children comprised children reared in their families and recruited from pediatric clinics in Bucharest (NIG;  $n = 72$ ). This group was

not randomly assigned and served as a comparison group. Figure 1 illustrates the flow of participants through the study. All children were originally recruited when they were between 6 and 31 months of age. Data presented in this study were obtained during the course of the 42-month assessment, which occurred 11–36 months after randomization. As noted in Figure 1, there were 57 CAUG, 61 FCG, and 51 NIG who completed SSPs with usable data at 42 months.

For ethical and legal reasons, we did not interfere with any decisions regarding children’s placements, leaving those decisions to Romanian child protection officials. The one exception was that we ensured that no child randomized to foster care would be readmitted to institutional care during or after the study. Between the baseline and 42-month assessments, a number of children changed status (see Figure 1). In the following analyses, we followed an “intent-to-treat” approach, so that children were assessed in their original group (CAUG or FCG), regardless of their status at 42 months.

Additional details regarding sample recruitment are available (Zeanah et al., 2005). Table 1 provides demographic information for the study sample. As noted in Table 1, the ethnic distribution of the randomized groups (CAUG and FCG) is similar (Roma ~33%) but it differs from the comparison group. The overrepresentation of children of Roma heritage in institutions has been noted previously (Stephenson et al., 1993) and probably reflects the impoverished circumstances of many Roma. Early reports suggested that almost half of the young

children in Romanian institutions were of Roma heritage (Stephenson et al., 1993), despite the estimates that Roma account for < 10% of the population of Romania.

*BEIP Foster Care Intervention*

Foster care was conceptualized as an intervention to address the effects of institutionalization on young children. When the project began in 2000, there were almost no foster homes in Bucharest, and they primarily had been used by adoption agencies to prepare children for the transition from institution to adoption. BEIP created a network of 56 foster homes in Bucharest. Foster parents were recruited, completed a background check, and trained by Romanian trainers using a manual derived from similar manuals used in the United States. Foster parents were considered full-time employees and received a salary and benefits. This was in contrast to the United States, where foster parents usually receive board payment for each child and do not receive payment if no child is in their home.

Foster parents received support from and were monitored by BEIP social workers who visited with them regularly. Social workers assisted foster parents in managing challenging postinstitutional behavior and organized a support group for foster parents early in the project. Importantly, social workers supported the foster parents in the establishment of warm, supportive, and committed relationships with their young foster children. BEIP foster care was designed to be “child centered,”

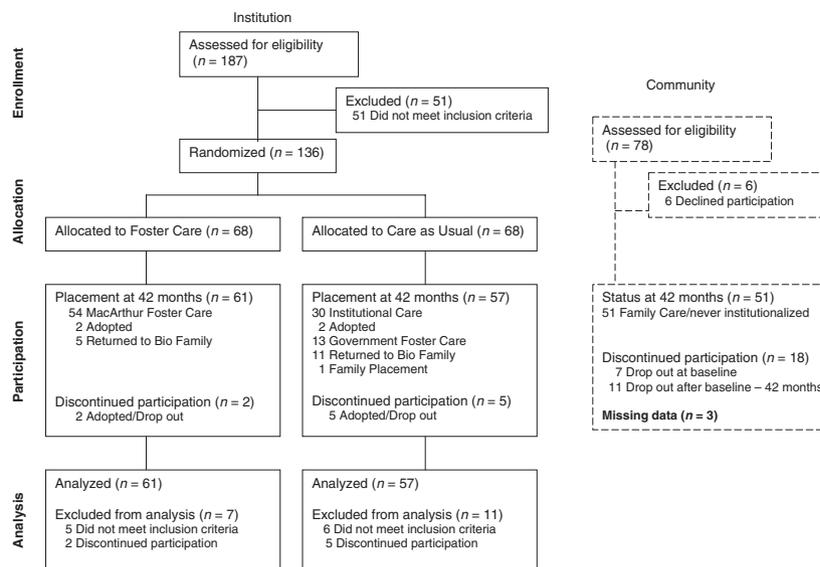


Figure 1. Flow of participants through the Bucharest Early Intervention Project study: Institution (randomized) and community (not randomized).

Table 1  
Demographic Characteristics of the Study Sample

Child characteristics	Care as usual ( <i>n</i> = 57)	Foster care ( <i>n</i> = 61)	Never institutionalized ( <i>n</i> = 51)	Significance
Age in months ( <i>SD</i> )	42.44 (.39)	42.37 (.28)	43.15 (.98)	NIG > CAUG, FCG***
Ethnicity, <i>n</i> (%)				
Romanian	26 (45.6)	35 (57.4)	46 (90.2)	NIG ≠ CAUG, FCG***
Roma (Gypsy)	21 (36.8)	18 (29.5)	4 (7.8)	
Unknown/other	10 (17.5)	8 (13.1)	1 (2.0)	
Gender				
Male	49.1%	52.5%	47.1%	NIG = CAUG = FCG

Note. CAUG = care as usual group; FCG = foster care group; NIG = never-institutionalized group.  
\*\*\**p* < .001.

that is, focused on recognizing the psychological as well as the instrumental needs of the young children in their care. In contrast to the frequent placement changes sometimes seen in foster care in the United States, there were very few moves within BEIP foster care. Several of the foster parents ultimately adopted the children they cared for, despite the fact that they would then no longer receive a salary for caring for that child. Foster parents were encouraged by project social workers to accept their foster children as members of the family and to become the “psychological parents” of the children for whom they cared.

The social workers were supported throughout the project by clinicians in the United States who provided weekly phone or video consultations. The consultants also visited the study center quarterly to provide in-person consultation, visit foster homes, and discuss issues that had arisen in the care of this challenging group of children. The emphasis was on developing attachment relationships between foster parents and children, facilitating language development in children, and providing foster parents with techniques for managing difficult child behavior (see Nelson et al., 2007, Supporting Online Material, for further information about the intervention).

### Measures

**Attachment.** The quality of children’s attachment to their caregivers was assessed using Ainsworth’s SSP (Ainsworth et al., 1978). Community children were seen with their mothers, foster children with their foster mothers, and institutionalized children were seen with their “favorite” caregivers, as identified by staff. If the child did not have an identified favorite, they were seen with a caregiver who worked with them regularly and knew them well.

Coders, who were native Romanians, were trained to reliability in the MacArthur Preschool System with W. Whelan (Cassidy & Marvin, with the MacArthur Working Group, 1992). All procedures were coded by a primary coder who was blind to the children’s group status. In addition, 120 (75%) of the procedures were double-coded to reliability; on the five-way (secure, avoidant, ambivalent, disorganized-controlling, and insecure-other) classification, kappa = 0.81 (95% CI = 0.73, 0.89). Percent agreement was 87.7%. For secure versus not secure coding, kappa = 0.83 (95% CI = 0.73, 0.93), percent agreement = 91.7%. For organized (secure, avoidant, and ambivalent) versus atypical (disorganized, controlling, and insecure-other) classifications, kappa = 0.93 (95% CI = 0.85, 1.01), percent agreement = 97.5%. Disagreements were resolved by conferencing.

In keeping with the MacArthur coding system, categories coded included secure (B), avoidant (A), ambivalent-dependent (C), disorganized-controlling (D), and insecure-other (I-O). Although the underlying strategy for obtaining comfort and reassurance from the attachment figure in times of distress remains the same as that seen in infancy, different behaviors are evident in preschool children. For example, secure attachment involves demonstrating a positive, engaged and open style of verbal and nonverbal interaction but less proximity seeking than in infancy. Children whose attachment is classified as avoidant have reduced involvement with the caregiver and do not seek contact when distressed. In addition, they say little to the caregiver, particularly about feelings, and they remain affectively neutral. Children whose attachment is ambivalent-dependent display passivity, helplessness, immaturity, or petulance and resistance in their interactions with the caregiver. Some preschool children whose attachment

is classified as disorganized display behaviors similar to toddlers classified as disorganized (see Main & Solomon, 1990), but others exhibit efforts to control the behavior of the caregiver, particularly following the stressful separation episodes of the SSP. Such behavior tends to follow one of two patterns: controlling-caregiving or controlling-punitive (Cassidy & Marvin, with the MacArthur Working Group, 1992). Because disorganized and controlling behavior are conceptually linked, the classification is called disorganized-controlling. Finally, Marvin and his colleagues (Cassidy & Marvin, with the MacArthur Working Group, 1992) identified an "insecure-other" classification to describe children who did not fit into the traditionally insecure categories. This classification was prevalent in previous studies of formerly institutionalized children (Marcovitch et al., 1997; O'Connor et al., 2003). Children who are classified as insecure-other are clearly not secure, but they also do not fit into one of the insecure categories described earlier. For example, some children classified as insecure-other display a fearful, "compulsive-compliant" pattern; others are severely emotionally dysregulated in the context of their caregiver. Still others exhibit both avoidant and resistant behaviors in their interactions with their caregivers. In other words, such children have not evolved a reliable strategy for managing their distress by seeking and receiving comfort and reassurance from their caregivers. Although behavior in interaction with their caregivers may vary, the underlying attachment representation for children who are categorized controlling or insecure-other, may be characterized by "themes of fear, confusion, chaos, and disorganization" (Teti, 1999, p. 230).

In addition to assigning a best fitting classification of attachment, coders also assigned a continuous rating of security, using a scale from 1 to 9, with 1 = *no security evident* to 9 = *most secure* (Cassidy & Marvin, with the MacArthur Working Group, 1992). Reliability for this coding was excellent ( $r = .87$ ).

*Cognitive development.* The Bayley Scales of Infant Development II (BSID-II; Bayley, 1993) were used to assess developmental status. The Mental Development Index (MDI), a scaled score, ranged from 50 to 150. Children who obtained scaled scores below 50 were assigned a numeric MDI score of 49. Raw scores were assigned an age equivalent score to enable analyses when scaled scores < 50 were obtained (Lindsey & Brouwers, 1999). DQs were computed for each child (i.e., [age equivalent score/chronological age]  $\times$  100).

*Quality of caregiving.* The Observational Record of the Caregiving Environment (National Institute of Child Health and Human Development Early Child Care Research Network, 1996, 1997) was adapted for use in assessing the quality of caregiving for a given child in his or her environment (see Zeanah et al., 2005, for an in-depth description of this measure). Children were videotaped in their "home" environment (i.e., CAUG: institution; FCG: foster home; NIG: family home) for 1½ hr with their favorite caregiver. Coders watched the videotape and coded qualitative items (e.g., sensitivity, intrusiveness) on a scale that ranged from 1 = *not at all characteristic* to 4 = *highly characteristic*.

A quality-of-caregiving score was determined by calculating the mean of the scores for sensitivity, stimulation of development, positive regard for child, flat affect (reversed), and detachment (reversed). Possible quality-of-caregiving scores ranged from 1 to 4. Scale reliability was acceptable (Cronbach's  $\alpha = .82$ ).

#### Consent

Following approvals by the Institutional Review Boards of the three principal investigators (Zeanah, Nelson, and Fox) and by the local Commissions on Child Protection in Bucharest, the study began in collaboration with the Institute of Maternal and Child Health of the Romanian Ministry of Health. Consent was signed by the Commissioner for Child Protection for each child participant living in his or her sector of Bucharest, as dictated by Romanian law. Further assent for each procedure was obtained from each caregiver who accompanied the child to the visit.

Ethical issues involving this vulnerable population have been discussed in detail elsewhere (Millum & Emanuel, 2007; Nelson et al., 2007; Wassenaar, 2006; Zeanah et al., 2006).

## Results

Overall distribution of attachment classifications, organization, and security, first, are presented by group. Then we compare security ratings for the groups. We then examine the important question of whether there is a critical age after which placement in foster care is less likely to result in an organized or secure attachment relationship. Finally, we examine whether specific factors such as gender, quality of caregiving, or cognitive skills are useful for predicting organization

Table 2  
Distribution of Strange Situation Procedure Classifications

Strange Situation procedure classification	Care as usual (%) ( <i>n</i> = 57)	Foster care (%) ( <i>n</i> = 61)	Never institutionalized (%) ( <i>n</i> = 51)
Secure (B)	10 (17.5)	30 (49.2)	33 (64.7)
Avoidant (A)	14 (24.6)	12 (19.7)	6 (11.8)
Ambivalent (C)	7 (12.3)	5 (8.2)	7 (13.7)
Disorganized-controlling (D)	3 (5.3)	8 (13.1)	5 (9.8)
Insecure-other (I-O)	23 (40.4)	6 (9.8)	0
Organized (A, B, C)	31 (54.4)	47 (77.0)	46 (90.2)
Atypical (D-controlling, I-O)	26 (45.6)	14 (23.0)	5 (9.8)

or security in young children previously institutionalized.

### SSP Classifications

The frequency distributions of SSP classifications are shown in Table 2. Differences were most apparent at the extremes of the classifications. Thus, only 17.5% of the CAUG but 49.5% of the FCG were securely attached. Further, 40% of the CAUG but only 13.1% of the FCG were classified as insecure-other. The distribution of the classifications across the three groups differed significantly,  $\chi^2(8) = 48.30$ ,  $p < .001$ . Comparison of the CAUG and FCG showed a significant difference,  $\chi^2(4) = 22.62$ ,  $p < .001$ , but no difference was found between FCG and the NIG,  $\chi^2(4) = 8.34$ ,  $p = .08$ . No significant differences were found between males and females in overall distribution of attachment classifications, nor were gender differences noted in the distributions of any of the individual groups. Ethnicity also was unrelated to any of the attachment measures.

Organization of attachment was dichotomized organized (A, B, and C) and atypical (D-controlling and I-O) as shown in Table 2. Significant differences were found among the three groups,  $\chi^2(2) = 18.33$ ,  $p < .001$ , and between the CAUG and FCG,  $\chi^2(1) = 6.75$ ,  $p < .01$ , but not between the FCG and the NIG,  $\chi^2(1) = 3.41$ ,  $p = .065$ . Differences were noted between males and females in organized versus atypical status for the FCG only,  $\chi^2(1) = 4.97$ ,  $p < .05$ , with FCG girls more likely to be organized than FCG boys.

In an even more stringent test of the intervention, we compared the frequency of secure (B) versus not secure (all others). Significant differences were found among the three,  $\chi^2(2) = 25.79$ ,  $p < .001$ , and between CAUG and FCG,  $\chi^2(1) = 13.16$ ,  $p < .001$ , but not between the FCG and the NIG,  $\chi^2(1) = 2.72$ ,  $p = .099$ .

Gender differences were found within the FCG,  $\chi^2(1) = 3.67$ ,  $p = .055$ , and the NIG,  $\chi^2(1) = 4.29$ ,  $p = .038$ ; girls were more often secure than boys within this group.

### Security Ratings

Coders assigned security ratings ranging from 1 to 9 for each procedure. Table 3 shows the average security rating for each group overall and by gender. Notably, even among dyads classified as secure in the CAUG, security ratings were lower than those of either the FCG or the NIG. Main effects of group,  $F(2, 169) = 17.10$ ,  $p < .001$ , and of secure versus insecure,  $F(1, 169) = 386.37$ ,  $p < .001$ , were significant. This pattern was additive across groups,  $F(2, 169) = 0.043$ ,  $p = .958$ . Security scores were highest among the NIG, next highest among the FCG, and lowest in the CAUG. A similar pattern was present for the organized versus atypical analyses. There was no association of these scores with gender or ethnicity.

### Effects of Age at Placement on Organization and Security

To investigate the effect of age at placement into foster care on organization and security, FCG children were grouped by dichotomous age at

Table 3  
Security Rating by Group

	Care as usual (%) ( <i>n</i> = 57)	Foster care (%) ( <i>n</i> = 61)	Never institutionalized (%) ( <i>n</i> = 51)
Security rating	3.13 (1.33)	4.61 (1.64)	5.49 (1.52)
Male	3.13 (1.39)	4.29 (1.59)	5.09 (1.65)
Female	3.13 (1.40)	4.96 (1.64)	5.83 (1.34)

Note. Security ratings: 1 = no security evident, 9 = most secure.

Table 4  
Organized Versus Atypical by Placement Age Group

Age cutoff (months)	Percent organized (SSP)		$\chi^2(1)$	p Value
	Younger	Older		
18	100	70.2	5.05	.025
20	100	67.4	7.22	.007
22	100	63.2	10.57	.001
24	96.6	58.1	12.41	.000
26	90.9	59.3	8.32	.004
28	85.0	60.0	4.66	.031

Note. SSP = Strange Situation procedure.

Table 5  
Secure Versus Insecure by Placement Age Group

Age cutoff (months)	Percent secure (SSP)		$\chi^2(1)$	p value
	Younger	Older		
18	53.8	46.8		<i>ns</i>
20	58.8	44.2		<i>ns</i>
22	63.6	39.5	3.26	.071
24	69.0	29.0	9.57	.002
26	66.7	25.9	9.87	.002
28	60.0	25.0	6.54	.011

Note. SSP = Strange Situation procedure.

placement in foster care (younger than cutoff vs. older than cutoff) for placement cutoffs of 18, 20, 22, 24, 26, and 28 months and then compared by organized versus atypical status and by secure versus insecure status. Tables 4 and 5 show significant differences between organized versus atypical status for children placed earlier when compared to those placed later for all age cutoffs. For secure versus insecure status, however, a deflection point was evident between 22 and 24 months, suggesting that children placed before 24 months had a better response to the intervention of foster care.

Table 6  
Developmental Quotient by Organized Versus Atypical and by Secure Versus Insecure Status

	Care as usual group (%) (n = 56)	Foster care group (%) (n = 61)	Never-institutionalized group (%) (n = 51)	
Developmental quotient	76.90 (13.31)	85.49 (14.23)	103.30 (11.85)	NIG > FCG > CAUG
Organized	81.36 (10.30)	87.97 (13.11)	104.50 (11.49)	Organized > atypical
Atypical	71.36 (14.68)	77.32 (15.18)	92.51 (10.38)	
Secure	77.40 (10.66)	91.03 (11.29)	107.48 (7.50)	Secure > insecure
Insecure	76.79 (13.92)	80.30 (14.89)	95.88 (14.54)	

Predicting Attachment Organization and Security

Multiple logistic regression was used to determine whether a child had an organized attachment (as opposed to atypical [disorganized or insecure-other] classification) at 42 months of age. Predictors included gender, quality of caregiving, *M (SD)*: CAUG: 2.54 (0.58); FCG: 2.78 (0.57); NIG: 2.73 (0.57); FCG > IG, and cognitive development (Nelson et al., 2007; see Table 6) as predictors. Logistic regression analyses were conducted for the CAUG, FCG, and NIG separately. For the CAUG, neither caregiving quality nor gender significantly predicted attachment organization, but cognitive development did (Wald  $\chi^2 = 5.54, p = .019, df = 1$ ). For the children in the CAUG, an increase of 1 unit in DQ at 42 months of age was associated with an increase in the odds of a child receiving care as usual having an organized attachment by a factor of 1.072 (95% CI = 1.012, 1.135). Similar logistic regression analyses performed on the never-institutionalized group and the FCG showed no significant associations between the odds of a child developing an organized attachment with his or her caregiver based on gender, cognitive development, or quality of caregiving. However, when length of time in foster care was added to the logistic regression for the FCG, after controlling for the effect of the other factors, it was the sole significant factor (Wald  $\chi^2 = 4.94, p = .026, df = 1$ ). An increase of 1 month in length of time in foster care was associated with an increase in the odds of a child in the FCG having an organized attachment by a factor of 1.273 (95% CI = 1.029, 1.574). Length of time in foster care was examined for the FCG only.

Similar analyses were conducted, using gender, quality of caregiving, and cognitive development as predictors to determine whether a child had a secure attachment (as opposed to an insecure attachment classification) at 42 months of age. Logistic regression analyses again were conducted for the CAUG, FCG, and NIG separately. For the

CAUG, neither caregiving quality, gender, nor cognitive development was associated with secure versus insecure status. However, for the FCG and the NIG, cognitive development at 42 months of age was associated with an increase in the odds of a child having a secure attachment (FCG: Wald  $\chi^2 = 5.022$ ,  $p = .022$ ,  $df = 1$ ; NIG: Wald  $\chi^2 = 7.247$ ,  $p = .007$ ,  $df = 1$ ). An increase of 1 unit in DQ was associated with an increase in the odds of a child in the FCG having a secure attachment by a factor of 1.056 (95% CI = 1.008, 1.106). For children in the NIG, a 1-unit increase in DQ was associated with an increase in the odds of a child in that group having a secure attachment by a factor of 1.144 (95% CI = 1.037, 1.262). When length of time in foster care was added to the logistic regression for the FCG, cognitive development became marginally significant (Wald  $\chi^2 = 3.71$ ,  $p = .054$ ,  $df = 1$ ) but the other factors were not associated with increased odds of secure attachment.

### Discussion

This study reports attachment results from the first ever randomized trial of foster care as an intervention for young children who had been abandoned and placed in institutions. We had earlier reported that in this sample, at a mean age of 21 months, institutional care was associated with profound disturbances of attachment, as reflected in part by 65% of the children classified as disorganized and another 13% who showed so little attachment behavior that they were designated "unclassified" in the SSP (Zeanah et al., 2005). Following placement in care for 12–36 months ( $M = 19.12$  months,  $SD = 6.80$  months), children in foster care made significant gains compared to children who remained in institutions. This was reflected in significantly more of them having secure attachment classifications and also having higher ratings of security. Further, significantly fewer of them had atypical (i.e., disorganized-controlling or insecure-other) classifications. Because we used intent-to-treat analyses, the findings we report are likely conservative estimates of intervention effects.

These findings indicate that young children placed into foster care after early institutional rearing may experience significant recovery with regard to attachment. Furthermore, because of the randomized design, we can conclude that the placement in families was causally related to improvement in the children's attachment status. This is one of several studies that have shown that chang-

ing caregiving environments changes children's attachments (Cicchetti et al., 2006; Dozier et al., 2007; Fisher & Kim, 2007; Heinicke et al., 1999; Klein Velderman et al., 2006; Toth et al., 2002; van den Boom, 1994).

The magnitude of these results is notable. For example, the 49% of children classified securely attached in the FCG is greater or equal to what has been reported in two studies of children adopted internationally out of Romanian institutions. Marcovitch et al. (1997) found 30% of 3- to 5-year-olds and O'Connor et al. (2003) found 47% of 4-year-olds were securely attached to their adoptive mothers. Even more striking, only 13% of the FCG were classified as insecure-other, whereas 42% of the Marcovitch et al. (1997) sample and 47% of the O'Connor et al. (2003) sample had this unusual classification. Although adoptive parents in Canada and the United Kingdom are likely to have socioeconomic advantages not available to foster parents in Romania, this may be overshadowed by the absence of cultural transition for the BEIP children compared to those adopted internationally. Because both the Marcovitch and O'Connor samples included children adopted soon after the fall of Ceausescu, the differences in attachment following placement in families may result from more severe conditions of privation than existed 10 years later when the BEIP was conducted. For example, the largest institution for young children in Romania, St. Catherine's Placement Center, known as Bucharest Number One during the Communist era, had 850 children living there in 1989, but only 450 in the fall of 2000.

A second important finding was that age at which children were placed in foster care was powerfully related to recovery of attachment. This was evident in both analyses of organized attachments (secure, avoidant, and ambivalent) and of secure attachment. The younger a child was placed in foster care, the more likely the child would develop an organized attachment at 42 months. For security of attachment, however, children placed before 24 months of age were more likely to have secure attachments at 42 months. One implication of these findings is that at least in the first 3 years of life children retain considerable plasticity for adaptation with regard to attachment. This supports our theoretical notion that attachment reflects experience-expectant neural processes. That is, even following experiences of social and material deprivation, children who are placed in more species typical caregiving environments exhibit a strong disposition to form

attachments. On the other hand, another implication of the findings is a decreasing plasticity of attachment with increasing age and are in keeping with Dozier and Bick's (2007) observation that children placed in foster care younger than 12 months were able to develop trusting relationships with new caregivers more quickly than older infants and toddlers (Dozier & Bick, 2007). An important question for future research is the degree to which subsequent experiences can compensate for early adversity and specifically whether the large number of insecure-other attachment classifications predicts subsequent psychopathology or interpersonal difficulties.

Gender seemed to moderate the effects of the intervention, with girls showing more response to the foster care intervention than boys. The pattern of boys in high-risk samples showing greater incidence of disorganized attachment than girls has been noted by Carlson, Cicchetti, Barnett, and Braunwald (1989) and others (David & Lyons-Ruth, 2005; Vondra, Hommerding, & Shaw, 1999). In contrast, most studies examining attachment organization, particularly in lower risk samples, do not show gender differences. It may be that male gender, in the context of markedly compromised environments, poses a risk that it does not in less challenging environments.

On the other hand, we noted that when gender was included in the regression analysis, along with caregiving quality and cognitive development, as factors influencing the likelihood of developing an organized attachment relationship or a secure attachment relationship, it was not significant for any of the groups. In fact, caregiving quality was also not significant. Rather, for the CAUG, greater cognitive development suggested greater likelihood of developing an organized relationship but not of developing a secure one. It is possible that in the context of the institutional setting, children more capable of engaging their caregivers are more likely to develop an organized attachment with their caregivers, although not a secure one. Given that age of placement is confounded with length of time in foster care, it is not unexpected that this factor is an important influence in the development of organized attachment for the FCG.

Individual differences in caregiving quality at 42 months were not related to children's attachment organization. This may be a result of the single, relatively brief observation being insufficient as a measure of caregiving quality, especially considering that a number of children had changed caregiving environments between baseline and 42 months.

The present study is not without limitations. First, because of the practice in Romania of keeping abandoned children in maternity hospitals during the first 6 months of life, none of the children we studied were younger than 6 months of age. This makes evaluating the impact of very early foster care impossible. In addition, comparisons with studies of children adopted out of institutions are more challenging because both the Rutter et al. (2007) and Chisholm (1998) studies found more favorable development in children adopted younger than 6 months. We chose to use the MacArthur approach to code our SSPs and we recognize that whereas several studies have used this methodology, others have used the Preschool Assessment of Attachment (Crittenden, 1992). A comparison of these two methods might be of interest but was beyond the scope of this study. Second, as seen in Figure 1, despite initial random assignment of the institutionalized children to either the CAUG or the FCG, a great deal of movement between and among groups occurred. This was an important ethical constraint, but it made pure group comparisons impossible. We used intent-to-treat analysis and study of the figure indicates that the majority of the movement was in children assigned to CAUG who ended up in families, either adoptive or their own biological families. As a result, we believe that the results we reported are a conservative estimate of the impacts of the intervention. Finally, as noted earlier, one reason we were unable to demonstrate dose-response effects of the intervention may be because the measure of caregiving quality that we used was based on too brief a period of observation or insensitive to important differences.

The unique population of children reared in institutions remains important in our efforts to understand more fully the effects of atypical environments on young children's development and the processes through which they recover from early adversity.

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