PREDICTORS OF THE COGNITIVE DEVELOPMENT OF CHILDREN ADOPTED FROM ROMANIAN ORPHANAGES

by

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Predictors of the Cognitive Development of Children Adopted from Romanian Orphanages

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Abstract

Cognitive development was evaluated in children who had spent at least 8 months in a Romanian orphanage (RO) and two comparison groups of children: a Canadian-Born, non-adopted, never institutionalized comparison group (CB) and an Early Adopted comparison group adopted from Romania before the age of 4 months (EA). Children were assessed on the Stanford-Binet and the Bracken Basic Concept Scale. Parent-child interaction was evaluated during free play and a teaching task, and the quality of the home environment (HOME) was assessed. RO children scored lower than CB children on all cognitive measures, and on most measures RO children scored lower than EA children. RO children were more impulsive than CB children, and were more helpless in their responding and less task oriented than CB and EA children. RO children's developmental status was positively related to HOME scores, to parental sensitivity and teaching ability, and to children's task-oriented behavior, and negatively related to time in institution and to children's impulsivity.

DEDICATION

To Douglas and Charlie for all their love, patience, and support through this and all our adventures. And a special welcome to Christopher who planned his entrance into this world at a wonderful time!

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And finally, a very special thank you to the families who participated in this work by sharing their own experiences in an effort to benefit parents who plan to adopt internationally in the future.

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Institutionalization has long been known to affect the development of children. A few studies have examined the cognitive development of orphanage-reared children post-adoption (Benoit, Jocelyn, Moddemann, & Embree, in press; Dennis, 1973; Flint, 1978; Goldfarb, 1943, 1945, 1955; Groze & Ileana, 1995; Provence & Lipton, 1962; Taylor, 1968). Most have reported that children with this background continued to display deficiencies in cognitive development and in problem-solving abilities, even many years after adoption (Goldfarb, 1943; Flint, 1978; Provence & Lipton, 1962; Taylor, 1968). Previous studies used questionable methodology or studied children fostered in multiple placements rather than placed in stable adoptive homes. As well, no study has examined the potential influence of the adoptive family on the orphanage-reared child. Given that the 1992 Conference of the North American Council on Adoptable Children revealed that international adoption, especially of children from underprivileged backgrounds, has been increasing steadily throughout the last decade, it seems necessary to re-evaluate the effects of institution-rearing on young children's development and to evaluate the influence of the adoptive home on the child. The main purpose of the present study was to examine the cognitive development and problem-solving skills of children adopted by Canadian families after spending a minimum of 8 months in a Romanian orphanage, and to evaluate the influence that a stable adoptive family and home environment had on their development.

Effects of Institutional Rearing on Intelligence

Studies comparing institutions to home environments have shown that orphanages offer fewer opportunities for children to acquire or practice new skills, provide inadequate motivational conditions involving reinforcement and praise, and little variation or adaptation to individual needs or differences (Yarrow, 1961). Recently Kaler and Freeman (1993) examined the developmental status of children between 23 and 50 months of age living in a Romanian orphanage and found deficits in cognitive and social functioning, with the majority

of children displaying severe delays. Studies examining the follow-up of children adopted from orphanages in Romania (Groze & Ileana, 1995), as well as orphanages similar to those in Romania (Dennis, 1973; Flint, 1978; Goldfarb, 1943, 1945, 1955; Provence & Lipton, 1962) have revealed that, although children improved in the more stimulating environment of a home, certain aspects of their cognitive development continued to display deficiencies presumably due to their unresponsive and unstimulating backgrounds. Post-institutionalized children displayed lower IQs than other children (Dennis, 1973; Goldfarb, 1943, 1945), and had difficulties in particular areas of cognition. For example, post-institutionalized children displayed delays in concept formation, as evidenced by a difficulty in organizing a variety of stimuli meaningfully and in abstracting relationships from them (Flint, 1978; Goldfarb, 1945); in generalizing from one situation to another (Provence & Lipton, 1962); in understanding concepts of space and time, as evidenced by their consequent disregard for school and family rules of behavior, wandering off, limited foresight, and a difficulty grasping or anticipating the future (Goldfarb, 1945); and in language, as displayed by a prolongation of the period of mimicking, excessive concreteness of thought, and a delay in spontaneous verbalizations, in expressing ideas, and verbalizing feelings (Provence & Lipton, 1962).

Methodological problems are evident, however, in these studies. As McMullan (1993) has pointed out, Dennis (1973) reported overall IQ on a language-adapted version of the Stanford-Binet when children ranged from several months post-adoption to 16 years post-adoption; Flint's (1978) study incorporated an intervention programme that may have affected children's overall outcome; and Goldfarb (1943, 1945, 1955) studied children who were fostered in multiple placements rather than placed in stable adoptive homes. More recently Groze and Ileana (1995) based their findings on parental reports of a highly educated (mean level: Master's degree) subsample of adoptive parents who responded to their survey, which may have positively biased their results. Therefore, one of the objectives of the

present study was to re-examine the effect of institutional rearing on the intelligence of young children once they have spent time in stable adoptive homes.

Effects of Institutional Rearing on Problem-solving Skills

Another aspect of particular interest to this study is the children's problem-solving abilities. Studies examining children post-adoption found that children reared in an institutional environment displayed deficiencies in effective problem-solving skills. Children were less capable of sustained effort and were more prone to quit a task that was difficult than were to non-institutionalized children (Goldfarb, 1943). They had difficulty in control and modulation of impulse and capacity to defer gratification, rarely turned to adults for help in solving problems (Provence & Lipton, 1962), and tended to be distractible (Flint, 1978; Goldfarb, 1943, 1945).

Several theorists have suggested that adequate cognitive development is dependent upon children's acquisition and use of effective cognitive strategies (Bransford & Stein, 1984; Brown & DeLoache, 1978). Problem-solving strategies are goal-directed procedures or patterns of decisions that are more sophisticated than random trial and error, and involve some degree of task analysis, monitoring of solutions, effective use of memory to retain goals and subgoals, and use of discovered information to guide further efforts (Bransford & Stein, 1984; Siegler & Jenkins, 1989; Willatts, 1990). Infants display some strategic behaviour in overcoming obstacles (Willatts, 1990), and it is based on their primitive and often ineffective techniques that the more mature and effective strategies of older children develop (Bjorklund & Harnishfeger, 1990).

Some theorists assert that effective problem-solving strategies are the result of mere practice (Kontos, 1983; Kontos & Nicholas, 1986) or exposure to a stimulating environment (Burns, Haywood, & Delclos, 1987; Hess & Shipman, 1965), while others believe that effective use of strategies is contingent on parental influence or tutoring (Wertsch, McNamee, McLane, & Budwig, 1980; Rogoff, Ellis, & Gardner, 1984). In either case,

children living in orphanages with minimal stimulation and high child-to-caregiver ratios probably have little opportunity for developing age-appropriate problem-solving skills. And children who lack opportunities to solve problems, to practice skills, and to be motivated by responsive caregivers may lack the appropriate cognitive skills to adapt to a new stimulating environment. A second objective of the present study was therefore to examine the problem-solving abilities of children reared in orphanages for the first part of their lives and to evaluate the relationship between their skills and their cognitive development post-adoption.

Predictors of Progress Post-adoption

Few studies have examined potential ameliorative or beneficial factors that may influence a child's cognitive development after leaving the unstimulating environment of most orphanages. Dennis (1973) postulated that the enriched experience of family life would aid cognitive growth, while Flint (1978) and Provence and Lipton (1962) discussed the beneficial influence of maternal care that promotes a dependent relationship. No research to date, however, has empirically measured the influence of such factors on children adopted from orphanages similar to those in Romania. Clarke and Hanisee (1982) and Winick, Katchadurian, and Harris (1975) examined the cognitive development of children adopted from underprivileged backgrounds and postulated that improvement in the children's social and cognitive development was related to the relatively high social status of the adoptive families. No systematic investigation of the relationship between the child's improvement and social status or specific aspects of the adoptive home environment was made in these studies. An interesting area of study that remains unaddressed, therefore, pertains to the specific environmental factors that influence adopted children's progress once they have spent time in their more stimulating homes.

Numerous studies have addressed the relationship between early cognitive development and socioeconomic status (SES) or quality of the home environment in the general population (e.g., Bradley, Caldwell, Rock, & Harris, 1986; Bradley et al., 1989;

Gottfried, 1984). A meta-analysis of studies in this area revealed that early home environment accounts for a significant portion of the variance in cognitive performance in the preschool years (Gottfried, 1984). Factors at 2 years of age that showed strong and consistent relationships with children's IQs at 3 to 5 years of age were maternal involvement, number of appropriate play materials, and maternal responsivity. The presence of age-appropriate toys, visual and physical exploration, and amount of personal space in the early years may also be important in the prediction of cognitive development (MacPhee, Ramey, & Yeates, 1984). Another objective of the present study was to explore the influence of the adoptive home environment on young children's cognitive development after they have left the institution and spent some time in their new homes.

A potentially confounding influence in the relationship between family variables and child outcomes is that parents (the environment) and children influence each other over time. This process is known as the transactional model of development (Cicchetti, Toth, Bush, & Gillespie, 1988; Sameroff & Chandler, 1975), in which the child and the environment are seen as reciprocally influencing each other, such that development at a later point reflects not only the quality of earlier adaptation but also the effect of intervening environmental inputs. So for example, children with delayed development may be less responsive to stimulation and may provide insufficient cues to families for toys and activities that contribute to development. Siegel and Cunningham (1984) found that the homes of delayed and nondelayed children diverged over time, with children who showed positive developmental change (delayed at 1 year to not delayed at 3 years) coming from more stimulating environments than those who continued to show developmental delay. The authors attributed this to a positive feedback loop where young delayed children provide inappropriate cues, the parent replies with less stimulation, the child becomes further delayed, and it subsequently becomes harder to read the child's cues.

Another aspect of a child's environment that has been associated with cognitive development is the influence of specific caregivers. Belsky (1981) conducted an extensive

literature review of studies examining the effects of early experience on intellectual development and found that a large number of studies suggested the importance of positive roles played by attentive, warm, stimulating, and non-restrictive mothers. Secure attachment in infancy (which has been strongly associated with these maternal characteristics; Bretherton, 1985) was shown to be positively related to exploration of the environment, to problem-solving ability, to use of the parent during a difficult task, and to more initiative and persistence in task performance in the second year of life (Hazen & Durrett, 1982; Matas, Arend, & Sroufe, 1978).

Many studies examining the influence of the parent-child relationship have examined the effect of early attachment on the child's subsequent performance or competence (Arend, Gove, & Sroufe, 1979; Hazen & Durrett, 1982; Matas et al., 1978). Concurrent assessment of the positive relationship between preschoolers and their mothers and children's cognitive functioning has been examined more recently (Crowell & Feldman, 1988; Estrada, Arsenio, Hess, & Holloway, 1987; Jennings & Connors, 1989; Roberts, 1983). Two main parental interaction variables have been shown to influence cognitive abilities and problem-solving skills in children. One variable encompasses the warmth and acceptance (sensitivity) a parent feels toward the child, and the other relates to the amount of restriction and structure (control) a parent uses in interaction with the child.

A positive affective tone (Jennings & Connors, 1989) and a positive affectional relationship (Estrada et al., 1987), as defined by the mother's responsiveness to and warm concern for her child, her flexibility in interaction, and a low frequency of punishment, were shown to be significant predictors of cognitive ability in preschoolers. In addition, children from dyads with positive affective qualities were more likely to persist in activities, to initiate new activities, and to choose challenging tasks than children from dyads with less positive affective qualities (Estrada et al., 1987).

Although parental warmth and sensitivity seem to influence a child's development in a consistent fashion, the pattern of influence of control or restriction appears more variable or

contingent. High levels of control, defined as intrusiveness or restriction, are seen as problematic, as are very low levels of control. Maternal intrusiveness and control early on in a child's life have been related to lower competence and maladaptation later in development (Egeland, 1985; Egeland, Pianta, & O'Brien, 1993). Using longitudinal data, children of mothers judged to be intrusive at 6 months were anxiously attached at 12 months (Egeland, 1985). In addition, these children showed less positive affect and persistence and more noncompliance and frustration at 24 months (Egeland, 1985) and were doing poorly academically, socially, emotionally, and behaviorally in first and second grade (Egeland et al., 1993). Very high levels of control or restriction have also been associated contemporaneously with decreased levels of competence (Crowell & Feldman, 1988; Roberts, 1983). More moderate levels of controlling behavior defined as attention-focussing or facilitative directing, however, are seen as necessary for cognitive development and improved problem-solving abilities (Jennings & Connors, 1989; Wertsch et al., 1980). The key issue with this type of behavior is for the parent to know when to step in and provide structure for the child, and when to step back and allow the child to try on his/her own, often referred to as scaffolding.

Patterns of control are also related to parents' perceptions of children's abilities and to children's developmental status. Mothers who perceive their children to be less intrinsically motivated are more controlling with their children than mothers who perceive their children to be more intrinsically motivated (Jennings & Connors, 1989). In addition, mothers of developmentally delayed children spend more time controlling their child's behavior and are more frequently intrusive during social play than mothers of non-developmentally delayed children (Cielinski, Vaughn, Seifer, & Contreras, 1995; Crowell & Feldman, 1988; Terdal, Jackson, & Garner, 1976). So it appears that if parents perceive that their child requires more guidance and control to accomplish a task, that is, that the child is unable to perform independently, higher levels of control or directiveness are used.

Due to the delayed development and distractibility or poor concentration of children reared in institutions, perhaps more control and directiveness on the part of the parent is necessary for improved development. Flint (1978) employed an intervention programme with children reared in institutions that emphasized more control and structuring on the part of the adoptive parents than would normally be required or recommended with children reared in normal environments. She reported that this intervention indeed facilitated cognitive growth in these children; however, no systematic evaluation was conducted. It seems important, therefore, to assess not only the influence of the sensitive aspect of the parent-child relationship but also the controlling and directive aspect of the relationship on a young child's cognitive development.

Previous Results on this Sample of Romanian Orphans (Time 1)

Examination of children adopted from Romanian orphanages (Morison, Ames & Chisholm, 1995) showed that after approximately 11 months in their adoptive homes (Time 1), the majority of children remained delayed in two or more areas of development according to parental report on the Revised Denver Prescreening Developmental Questionnaire. In addition, Revised Gesell Developmental assessments on 23 of the 43 children in the orphanage sample revealed that although children were progressing at more than one month developmentally for each chronological month in Canada, developmental quotients in the areas of gross motor, adaptive, personal-social, and language development averaged in the borderline range (68-85), while fine motor abilities averaged in the low end of the average range (85+) (Morison et al., 1995). Although the level of the children's problem-solving ability was not explicitly examined in the first phase of the study, Mainemer and Gilman (1992) reported significantly higher levels of distractibility in the orphanage children than in Canadian-Born, non-adopted, never-institutionalized children.

Morison et al. (1995) found that at 11 months post-adoption, the developmental status of Romanian orphanage-reared children was strongly related to institutional factors such as the presence of toys to play with and whether a child had been a favorite in the orphanage;

however, no adoptive family demographic variables were related to children's development. Given that these children had been with their adoptive families for under a year, it remains important to examine whether, given more time, orphanage-reared children adapt to their new environment and continue to improve in their development, and whether the same factors are related to their progress.

The Present Study

Past research on the effects of institutional rearing on cognitive development suggests that unstimulating and unresponsive environments such as those found in Romanian orphanages hamper the cognitive growth of young children (Dennis, 1973; Goldfarb, 1943, 1945; Flint, 1978; Provence & Lipton, 1962). Such studies have also reported long-lasting deficiencies in overall IQ (Dennis, 1973) in addition to deficiencies in particular areas of cognitive functioning (Goldfarb, 1943, 1945; Flint, 1978; Provence & Lipton, 1962). Due to questionable methodology and foster placement of children in past research, further validation of these findings is required.

The first objective of the present study was to document the effect of Romanian institution-rearing on the cognitive development of children who had been adopted into Canadian families. Cognitive development was evaluated in two subsamples of children who spent at least the first 8 months of their lives in an unstimulating and underfunded orphanage in Romania. One subsample included children adopted before two years of age, who were seen at the age of 54 months; the other subsample included children adopted after 2 years of age, who were seen when they were between 5 1/2 and 9 years of age. The division of the sample into two subsamples was both for practical and theoretical reasons. First, I wanted to see as many of the children as possible when they were the same age. For this reason and for data collection purposes, this meant 54 months of age would be a good age to see most of the children. Second, Dennis (1973) concluded that two years at adoption was a marker for whether post-institutionalized children would recover from their early experiences and catch up to non-institutionalized children.

Based on previous findings, I hypothesized that both groups of children would have significantly lower overall IQs than would children their same age who had not experienced orphanage life. I also hypothesized that both groups of children would display lower school readiness than would children their same age who had not experienced orphanage life. Because past research (Goldfarb, 1943, 1945; Flint, 1978; Provence & Lipton, 1962) found that children with orphanage experience showed more deficiencies in concept formation, concentration abilities, space and time concepts, flexibility in thinking, and language development than children their same age who did not experience orphanage life, I also investigated whether orphanage children's intellectual deficits were general, or predominately in specific areas.

Given that some of the children were adopted from Romanian orphanages after extensive periods of time in the institution, it was important to examine the effect of length of institutional stay on cognitive development. Both Dennis (1973) and Flint (1978) have reported greater deficiencies in children adopted at older ages. I therefore hypothesized that total time in the institution would be negatively related to overall IQ.

In conjunction with assessment of overall cognitive development, some studies examining the effect of institutional rearing have noted that children with such backgrounds exhibited ineffective problem-solving abilities (Goldfarb, 1943, 1945; Flint, 1978; Provence & Lipton, 1962). Previous studies, however, did not explicitly examine the problem-solving skills of the children, nor did they relate these skills to the children's overall cognitive development. The dramatic increase in stimulation that institutionalized children are exposed to post-adoption may be overwhelming for them, and their lack of experience in dealing with such stimulation, for example, their lack of ability to overcome obstacles or organize incoming stimuli, may mediate their retarded cognitive development.

The second objective of my study was therefore to document the effect of institution-rearing on the development of problem-solving abilities in children adopted from Romanian orphanages. I hypothesized that children who spent at least the first 8 months of their lives in

an orphanage would display less effective problem-solving strategies than children who had spent no time or less time in an orphanage, and that their effective use of problem-solving strategies would be positively related to their overall performance.

Another area of study that has not been addressed in this literature is the influence of the adoptive home environment on children reared in institutions. To date only speculation about the influence of the adoptive family has been offered (Flint, 1978; Provence & Lipton, 1962). Numerous studies, however, have examined the positive influence of the quality of the home environment in stimulating cognitive growth in children living with their biological parents (Bradley et al., 1986, 1989; Burns et al., 1987; Gottfried, 1984) and a few adoption studies have demonstrated improved cognitive functioning upon adoption into more stimulating home environments (Clarke & Hanisee, 1982; Winick, Katchadurian, & Harris, 1975). Particular aspects of the parent-child relationship, namely sensitivity and control, have also been shown to influence cognitive functioning and problem-solving skills in non-adopted samples of preschool-age children (Crowell & Feldman, 1988; Estrada et al., 1987; Hazen & Durrett, 1982; Jennings & Connors, 1989; Matas et al., 1978; Roberts; 1983). My third objective was therefore to examine the potential influence of the adoptive home and the adoptive parent-child relationship on the cognitive development of orphanage-reared children.

First, I hypothesized that the quality of the adoptive home environment would be positively related to the cognitive development of children adopted from Romanian orphanages after they had spent some time in their new homes. I also predicted that a sensitive relationship between parent and child would be related to better cognitive development in the young adoptees. These relationships were also expected in children who were not reared in orphanages.

I also expected that parental control would be related to cognitive development in children; however, I hypothesized that this relationship would differ for children reared in orphanages compared to those who were not. Based on parental report during Time 1 of this

study that orphanage children were more distractible than other children (Mainemer & Gilman, 1992), I expected that more control and directiveness would be used by parents of Romanian orphanage children than by other parents. Based on the work done by Flint (1978), I also expected that more control and directiveness by parents in the Romanian orphanage group would be associated with better cognitive development in the children. The relationship between control and cognitive development was expected to be negative in parent-child relationships of children not reared in orphanages, as high control would be expected to be detrimental to normal development (Egeland, 1985; Egeland et al., 1993).

Three groups of children and their families were examined in the present study: 1) a group of Romanian children who spent at least the first eight months of their lives in a Romanian orphanage, and who were subsequently adopted by Canadian families (RO); 2) a group of Romanian children who would have gone into orphanages had they not been adopted in the early months of their lives by Canadian families (EA); and 3) a group of Canadian-Born children, never-institutionalized, living with their biological parents (CB).

Method

Participants

Romanian Orphanage (RO) Group. The Romanian Orphanage group comprised 43 children, 21 males and 22 females, who had spent at least 8 months (range 8 to 53 months) in a Romanian orphanage prior to their adoption to Canada. Their median age at adoption was 17 months (range 8 to 68 months) and the median length of time children had spent in institution was 16 months (range 8 to 53 months). It is clear from this and from the high correlation between orphanage children's age at adoption and their total time in an institution ($r(43) = .97$, $p < .001$) that these children had spent most of their lives in institution prior to their adoption. All 33 of the orphanage group parents who were asked the reason for their children's institutionalization stated that the reason was abandonment. At Time 1 the median age of the children was 30 months (range 18 to 76 months) and they had been in their adoptive homes for a median of 11 months (range 4 to 25 months).

Three RO children who had participated at Time 1 could not be located at Time 2. Three new RO children for whom we did not have Time 1 data participated at Time 2. At Time 2, 28 of the RO children were seen when they were between 53 and 55 months of age. One child was seen at 50 months of age because her family was moving to Europe prior to her turning 54 months of age. Two other children were 57 months old and 58 months old, respectively, at the time of interview because one family could not be located until then and the other family had just been learned about at that time. The remaining 12 older RO children ranged from 65 to 110 months of age at the Time 2 interview. At Time 2 the median age of the entire RO group was 54 months (50 to 110 months), and children had been in their adoptive homes for a median of 39 months (range 26 to 57 months).

Canadian-Born (CB) Group. The Canadian-Born group comprised 43 non-adopted, never-institutionalized children (21 males, 22 females), each of whom was individually matched in sex and 40 of whom were matched in age at interview (± 1 month) to a child in the RO group. As a result of scheduling difficulties, one CB child was 4 months older than her RO match, and 2 children were 2 months older than their RO matches.

Three CB families were added at Time 2 to serve as matches for the new RO families seen at Time 2. Two CB families who had participated at Time 1 refused to participate at Time 2, and a third CB family could not be included at Time 2 because they were inadvertently tested one year too early.

The demographic characteristics of the two groups at Time 2 are displayed in Table 1. Socioeconomic status (SES) was primarily based on education and income and to a minor extent on occupational prestige. This index (Blishen, Carroll, & Moore, 1987) was developed from 1981 census data for the complete labor force in Canada. All occupations are divided into 514 groups with scores ranging from 28 to 78. Representative occupations of people whose Blishen score is near the mean of the present sample include firefighter, sales

Table 1

Demographic Characteristics of Matched Pairs of RO and CB Children

	No. of matched pairs	RO Group	CB Group
Time in institution (mos)	43	16 (8-53)[a]	---
Age at adoption (mos)	43	17 (8-68)	---
Time in adopted home (mos)	43	39 (26-57)	---
Age at interview (mos)	43	54 (50-110)	54 (50-109)
No. of children in family	43	2 (1-11)	2 (1-5)
Religious service attendance	43	1 (0-3)	0.5 (0-3)
Mother's education (yrs)	43	14.0 (2.3)[b]	14.3 (2.4)
Father's education (yrs)	36	14.6 (4.0)	14.8 (2.8)
Mother's age	43	38.0 (5.9)	37.5 (4.2)
Father's age	37	40.1 (7.0)	39.5 (4.1)
SES[c]	42	50.0 (14.1)	53.4 (14.0)
No. of single parents		4	2
Employment status of mothers			
No. not working		17	18
No. working part-time		7	16
No. working full-time		19	9
Type of residential area			
No. rural		4	1
No. suburban		38	42
No. urban		1	0

[a] Median (range)
[b] Mean (standard deviation)
[c] SES calculated as higher status parent's score on the 1981 socioeconomic index for occupations in Canada (Blishen, Carroll, & Moore, 1987).

manager, health inspector, and real estate salesperson. Attendance at religious services was scored on a scale that ranged from 0 = does not attend, 1 = attends only on special occasions, 2 = attends monthly, and 3 = attends weekly. The RO and CB groups did not differ significantly on any of the demographic characteristics shown in Table 1.

Early Adopted (EA) Group. The Early Adopted group comprised 26 Romanian children (12 males, 14 females) who would have grown up in a Romanian orphanage if they had not been adopted to Canada before they were 4 months of age. Only those children whose adoptive parents were certain they were destined for an orphanage if not adopted were included in this group. They were matched in sex and age at interview (± 1 mo.) to 26 children in the RO group. Their mean age at adoption was 2.3 months (range 0 to 4 months). At Time 1, the median age of the children was 25 months (range 18 to 37 months) and children had been in their adoptive homes for a median of 23 months (range 16 to 33 months).

There were four new EA families at Time 2 who served as matches for two RO families who did not have an EA match at Time 1 and two of the new RO families. Three EA families who had served as matches at Time 1 were changed to serve as matches for other RO families at Time 2. One was changed because we could not locate the RO match family at Time 2 and the EA family could serve as a match for another RO family who at Time 1 did not have an EA match. In addition, two families were changed because the RO family to whom they were matched only participated in a telephone interview, and the EA families could serve as matches for two other RO families who had participated in the home visits. Therefore, 22 of the 26 EA children were the same at Time 1 and Time 2.

At the Time 2 interview 26 of the EA children were individually matched in sex and age (± 1 mo.) to younger children in the RO group, so that 23 were between 53 and 55 months of age, and the other three were 50 months, 57 months, and 58 months of age. At Time 2 the median age of the Early Adopted children was 54 months (range 50 to 58 months)

and children had been in their adoptive homes for a median of 51.5 months (range 49 to 57 months).

The demographic characteristics of the 26 matched RO and EA families are presented in Table 2. Fathers' educational level was significantly higher in the Early Adopted group than in the Romanian Orphanage group, t (23) = 2.57, $p < .02$. Using an effect size calculation with the RO fathers' standard deviation, this indicates that the EA fathers' mean is at the 73rd percentile of the RO fathers' level of education. Otherwise, the two groups did not differ on demographic characteristics.

The demographic characteristics of the CB and EA matched groups are presented in Table 3. Mothers' age was significantly higher in the EA group than in the CB group, t (25) = 2.81, $p < .02$. Otherwise, the two groups did not differ on demographic characteristics.

Similarities and differences between pairs of groups. The RO and CB groups differ in that the children in the former group have been adopted and have experienced at least 8 months in a Romanian orphanage, while the latter group of children have never been adopted or institutionalized. These groups are similar in that the families were matched on demographic variables and the children were the same sex and age at interview. The RO and EA groups are similar in that both groups of children were adopted, the children were probably exposed to similar pre- and perinatal backgrounds and environments as both groups were destined for (EA) or were already in (RO) orphanage, and the children were the same sex and age at interview. These groups differ, however, on length of time in institution and on adoptive father's level of education. The EA and CB groups are similar in that the children have been with their families from birth (CB) or almost from birth (EA), the families are matched on demographic variables, and the children were the same sex and age at interview. These groups differ, however, in that EA children probably came from poorer pre- and perinatal backgrounds than CB children.

Table 2

Demographic Characteristics of Matched Pairs of RO and EA Children

	No. of matched pairs	RO Group	EA Group
Time in institution (mos)	26	13.0 (8-28)[a]	1.0 (0-4)
Age at adoption (mos)	26	14.0 (8-28)	2.0 (0-4)
Time in adopted home (mos)	26	40.0 (26-46)	51.5 (49-57)
Age at interview (mos)	26	54.0 (50-58)	54.0 (50-58)
No. of children in family	26	2 (1-4)	2 (1-5)
Religious service attendance	26	0.5 (0-3)	1 (0-3)
Mother's education (yrs)	25	13.8 (2.2)[b]	15.0 (2.8)
Father's education (yrs)	23	14.0 (3.1)	15.9 (3.2)
Mother's age	25	37.4 (5.4)	40.4 (6.5)
Father's age	23	39.2 (5.6)	41.0 (6.9)
SES	25	49.9 (14.2)	50.8 (12.7)
No. of single parents		3	1
Employment status of mothers			
No. not working		8	4
No. working part-time		4	10
No. working full-time		14	11
Type of residential area			
No. rural		2	0
No. suburban		23	26
No. urban		1	0

[a] Median (range)
[b] Mean (standard deviation)

Table 3

Demographic Characteristics of Matched Pairs of CB and EA Children

	No. of matched pairs	CB Group	EA Group
Time in institution (mos)[a]	26	---	1.0 (0-4)
Age at adoption (mos)	26	---	2.0 (0-4)
Time in adopted home (mos)	26	---	51.5 (49-57)
Age at interview (mos)	26	54.0 (50-59)	54.0 (50-58)
No. of children in family	26	2 (1-3)	2 (1-5)
Religious service attendance	26	0.5 (0-3)	1.0 (0-3)
Mother's education (yrs)[b]	25	14.3 (2.1)	15.0 (2.8)
Father's education (yrs)	23	15.2 (2.8)	15.7 (3.1)
Mother's age	25	37.2 (4.1)	40.4 (6.5)
Father's age	24	39.4 (4.3)	41.5 (7.1)
SES	26	52.2 (15.9)	50.8 (12.7)
No. of single parents		2	1
Employment status of mothers			
No. not working		12	4
No. working part-time		10	10
No. working full-time		4	11
Type of residential area			
No. rural		1	0
No. suburban		25	26
No. urban		0	0

[a] Median (range)
[b] Mean (standard deviation)

Procedure

Families were initially contacted by mail approximately 6 weeks prior to our visit. All aspects of the study were explained in this letter. Approximately 2 weeks later families were contacted by telephone. At this time we: a) established whether families were interested in participating in the study; b) reiterated and fully explained the procedures in the study so as to avoid confusion during the home visit; c) obtained parents' verbal consent for their child's participation; d) found out which parent was the primary caregiver (in the CB group this included one father and in the Early Adopted group this included two fathers) and asked that this parent be the participant in the study; e) set up a time for the home visit; and f) ensured that only the primary caregiver and the study child were present in the home on the day of our visit. A written reminder restating the procedures was mailed to families approximately one week prior to the home visit. As well, the evening before our visit we telephoned parents to confirm the appointment and to go over the procedures once again. The parent's written consent for the child's participation was obtained when we first arrived at their home. Written permission for the coding and viewing of the videotape was obtained at the end of our visit.

Two doctoral students [(Researcher A (the author) and Researcher B (Kim Chisholm)] visited the homes. Upon arrival, Researcher A interacted with the child and had the primary caregiver (henceforth to be referred to as "parent") fill out the consent form. Meanwhile Researcher B set up the video camera for the play interaction. An 8-minute free-play interaction between the parent and child then took place. It was immediately followed by a 3-minute parent-child separation sequence and 3-minute reunion sequence, which were not analyzed in the present study. The 4-minute Tower of Hanoi interaction task (Simon, 1975) then followed.

Upon completion of the interaction tasks, Researcher A set up the video equipment at a table in a separate room from where the parent was interviewed. Researcher A then said to the child "We're going to do lots of different things. Some of the things will be quite easy

and some of them will be harder. I want you to try your best and see how many of them you can do, OK?". Then Researcher A administered the Stanford-Binet (Thorndike, Hagen, & Sattler, 1986) to the child, followed by a short break, then the problem-solving tasks, and the Bracken Basic Concept Scale (Bracken, 1984).

While this testing was underway, Researcher B tape-recorded the interview with the parent in a separate room, asking various questions regarding the child's behaviour in the past 6 months, and any problems that the parent(s) were concerned about. The HOME (Caldwell & Bradley, 1984) was incorporated in the interview session.

Within two weeks after the home visit, parents were sent a brief report, written by Researcher A, on their child's performance on the Stanford-Binet and the Bracken Basic Concept Scale.

Cognitive measures

Stanford-Binet Intelligence Scale, 4th Edition (SB4) (Thorndike, Hagen, & Sattler, 1986) was used to assess the overall cognitive development of the children. The SB4 assesses children from 2 to 23 years of age. It is well-standardized, has very good internal reliability and reasonable criterion validity (Sattler, 1992). Certain subscales were of particular interest as they assessed dimensions addressed in past institutionalization literature (Dennis, 1973; Goldfarb, 1945): Vocabulary and Comprehension subscales were used to assess concept formation and language development, Memory for Sentences and Quantitative subscales were used to assess concentration abilities, and the Absurdities subscale was used to assess flexibility in thinking. A composite score, as well as factor scores in Verbal Reasoning and Nonverbal Reasoning/Visualization can be derived for the age range of our sample. All sessions were videotaped and all tasks were introduced using the standard procedures provided in the test manual. Administration time was approximately 40 minutes.

Task orientation during SB4. After completion of the administration of the SB4, the examiner (the author) rated a series of child behaviors taken from the face sheet of the Stanford-Binet. After viewing the videotape of the session, an undergraduate student,

unaware of the hypotheses of the study or of group membership, rated the same behaviors for reliability purposes. Five-point scales were used to rate the following behaviors:

1) Attention:

5= absorbed by task to 1= easily distracted

2) Reactions during test performance:

5= normal activity level to 1= abnormal activity level

5= initiates activity to 1= waits to be told

5= quick to respond to 1= urging needed

3) Problem-solving behavior:

5= persistent to 1= gives up easily

5= reacts to failure realistically to 1= reacts to failure unrealistically

5= eager to continue to 1= seeks to terminate

5= challenged by hard tasks to 1= prefers only easy tasks

Interrater agreement was determined using Pearson product-moment correlation coefficients and Cohen's kappas on 36% of the sample (n=40), distributed across the three groups (17 RO, 15 CB, 8 EA). Table 4 displays the correlation coefficients, which ranged from .40 to .81 with a median of .72, and Cohen's kappas (second rater within 1 point of first rater was considered an agreement), which ranged from .68 to 1.0 with a median of .90. There were no statistically significant differences between the ratings given by the examiner (knowledgeable of the hypotheses and group membership) and the reliability coder.

In order to consider computing a composite variable of task oriented behavior, the scale of quick-to-repond was recoded so that the midpoint of the scale (i.e., neither too quick to respond nor needing constant urging) was considered high on task orientation. The midpoint of the scale was recoded as 5, with the next points on either side of the midpoint recoded as 3, and finally the furthest points on either end were recoded as 1. High ratings on all the other scales were an indication of task oriented behavior. Internal consistency of the behavior ratings was then computed using Cronbach alpha. Given that the alpha was high

Table 4

Pearson Correlations Between Coders on Stanford-Binet Test Behaviors

Behavior	Correlation Coefficient	Kappa
Absorbed by task	.79**	.97
Normal activity level	.66**	.86
Initiates activity	.57**	.79
Quick to respond	.40*	.68
Persistent	.81**	1.00
Reacts to failure realistically	.64**	.93
Eager to continue	.77**	.83
Challenged by hard tasks	.79**	1.00

* $p < .05$

** $p < .001$.

(alpha = .89), the ratings were summed together to form a linear composite of the child's task orientation during the SB4.

The Bracken Basic Concept Scale (BBCS) (Bracken, 1984) was used to evaluate knowledge of concepts that most children acquire during preschool and early elementary school years. The test comprises 11 subtests, the first 5 of which (color, letter identification, numbers, comparisons, and shape) combine to form a School Readiness Composite, while the remaining 6 (direction/position, social/emotional connotations, size, texture, quantity, and time/sequence) are used to compute individual standard scores. Due to time constraints only the first 5 subtests and the direction/position and time/sequence subtests were administered to the children in this study. The direction/position subtest was used to assess children's understanding of space concepts and the time/sequence subtest was used to assess time concepts, both of which were addressed in the extant literature on the effects of institutionalization (Dennis, 1973; Goldfarb, 1945). The test covers children aged 2 1/2 to 8 years of age. The child is shown 4 or more pictures and asked to name or point to the correct picture. The BBCS is a well-standardized test with excellent split-half reliability, and validity coefficients from .68 to .88 (Sattler, 1992). It has been shown to correlate significantly with the Peabody Picture Vocabulary Test-Revised and the Metropolitan Readiness Test (Breen, 1985), and with the Wide Range Achievement Test-Revised (Sterner & McCallum, 1988). Standard age scores were used. Tasks were introduced according to standard procedure from the manual. Administration time was approximately 15 minutes.

Problem-solving Skills

Materials. Several perceptual-performance items from developmental tests were selected to assess problem-solving abilities. The items chosen (a) were designed for children at or slightly above the participant's chronological age; (b) required a minimum level of verbalization for successful performance; and (c) required the use of general cognitive

strategies such as systematic exploration, comparative behaviour, precision and accuracy, and restraining of impulsive behaviour for successful performance. (Although some of the tasks on the Stanford-Binet require such skills, most of them require verbal and memory-type skills that would not provide sufficient information on strategic ability.) Due to the varying ages of the children in the younger and older groups, different problem-solving tasks were used in the two groups in order to access problem-solving abilities of the children when tasks are increasingly more challenging. The following were test items for the younger children (4 1/2 year-olds):

1. *The Animal House subtest from the Wechsler Preschool and Primary Scale of Intelligence* (Wechsler, 1967). In this task, children were asked to match coloured pegs with particular animals. Skills needed for successful performance included attending to directions, and differentiating and matching colors and animals. The possible range of scores is 0 to 20.

2. *The Conceptual Groupings subtest from the McCarthy Scales of Children's Abilities* (McCarthy, 1972). In this task children were asked to categorize blocks by shape, color, and combinations of shape and color. Required skills included attending to directions, discriminating attributes, and considering more than one attribute at a time. The possible range of scores is 0 to 12.

3. *Raven's Coloured Progressive Matrices, series A pages 1 to 12* (Raven, 1960). In this task, children were asked to complete a pattern by selecting a missing piece of the pattern. Skills needed for successful performance included differentiating colors and shapes; matching colors, shapes, and numbers; counting; and considering more than one piece of information at a time. The possible range of scores is 0 to 12.

The following were the problem-solving tasks used with the older children (more than 5 1/2 years old):

1. *The Coding subtest from the Wechsler Intelligence Scale for Children Revised* (Wechsler, 1974). In this task, children were asked to copy symbols that were paired with other symbols. Skills needed included attending to directions, differentiating symbols, and

speed and accuracy. Children were given two minutes to copy as many symbols as possible. The possible range of scores is 0 to 45.

2. *The Picture Arrangement subtest from the Wechsler Intelligence Scale for Children Revised* (Wechsler, 1974). In this task, children were asked to order a series of pictures to form a short story. The task was discontinued when the child failed three consecutive series. Skills required included listening to directions, recognizing an underlying theme, and speed. The possible range of scores is 0 to 11.

3. *Raven's Coloured Progressive Matrices, series A & Ab* (Raven, 1960). In this task, children were asked to complete a pattern by selecting a missing piece of the pattern. Skills needed for successful performance included differentiating colors and shapes; matching colors, shapes, and numbers; counting; and considering more than one piece of information at a time. The task was discontinued when the child failed three consecutive items. The possible range of scores is 0 to 24.

All sessions were videotaped. The tasks were presented in the order listed above after the Stanford-Binet had been administered. Tasks were introduced using the standard procedures provided in the test manuals. The sessions lasted approximately 15 minutes. While the child was working, the experimenter responded with an "okay" or "good" after each item in the task. At the end of each test the child was told "you did a good job on that one".

Criteria for coding problem-solving skills in 4 1/2-year-old children. The coding system used was adapted from one used by Burns, Haywood, and Delclos (1987). Observers blind to group assignment coded the duration of the following state codes:

a. *Attention and on-task manipulation of the materials*: Child looked at experimenter or materials during instructions and/or looked at materials while performing; active manual contact with the materials that the child was working with, during the time to be manipulating materials and when the materials were being used toward completion of the task.

b. *Off-task behavior*: Refers to active manual contact with the environment or body that was not part of the materials in the study. This included manipulating task materials when the child should have been listening to instructions, or manipulating task materials in a way that was not directed toward completion of the task. As well, this code was used when the child was not paying attention to the task or was asking non-task oriented questions.

Coders also recorded frequency of event codes at the onset of the behaviour. The event codes were:

a. *Task talk:* The child explained what he/she was going to do before performing the task and/or explained intermediate steps, or talked in general about the task.

b. *Impulsive responding*: The child spoke, gestured, or started the task before the instructions were finished, or did the Animal House task "out of order" or picked an answer (peg or matrix) quickly and then changed it.

c. *Visual scanning*: The child looked at the model, or in the case of Animal House an item that he/she had already completed, to figure out what to do next.

d. *Helpless confirmation seeking*: The child looked to the tester while using the task material, or asked for help in a nonspecific request.

Four undergraduate volunteers coded the state and event codes. None of the coders were aware of group membership or the purpose of the study. Three of the coders each coded 3 videotapes which contained a combination of RO, CB, and EA children (approximately 10 children per tape). The fourth coder (reliability coder) double-coded one of the videotapes that each of the other coders had done. In all, 25% (n=27) of the problem-solving sessions were double-coded.

Because of the angle of the camera or the angle of the child's head on a majority of the tapes, visual scanning could not be reliably coded. As well, for the most part the 54-month-old children did not use strategies for the Raven's Matrices task; therefore coding of strategies during this task has been dropped.

Interrater reliability for the two state codes and the three remaining event codes on Animal House and Conceptual Groupings problem-solving tasks was determined using the Pearson product-moment correlation coefficient. Correlation coefficients between pairs of coders on the state codes (duration in seconds) ranged from .82 to .97 with a median of .95 (Table 5). Correlation coefficients between coders on the event codes (frequency counts) ranged from .40 to .95 with a median of .78 (Table 6). Due to the low reliability coefficients on the Conceptual Groupings task, the low correlations between state and event codes on the Animal House and Conceptual Groupings tasks (.31 for on-task manipulation, .32 for percent off-task, .15 for task talk, .43 for impulsive responding, and .26 for helpless confirmation seeking), and the use of few strategies during the Conceptual Groupings task, only the problem-solving strategies during the Animal House task were used in this study.

Criteria for coding problem-solving skills in older children. An adapted version of the Burns et al. (1987) coding system was also used with the older children. Observers blind to group assignment coded the duration of the child's *attention and on-task manipulation of the materials*, and *off-task behavior* as with the 4 1/2-year-old children.

Coders also recorded frequency of event codes at the onset of the behaviour. The event codes were:

a. *Task talk*: The child explained what he/she was going to do before performing the task and/or explained intermediate steps, or talked in general about the task.

b. *Impulsive responding*: The child spoke, gestured, or started the task before the instructions were finished or did the Coding task "out of order".

c. *Trial and error*: The child decided on an answer and then changed it.

d. *Visual scanning*: The child looked at the model (Coding and Raven's Matrices) or the unused cards (Picture Arrangement), or an item that he/she had already completed (Coding), to figure out what to do next.

e. *Helpless confirmation seeking*: The child looked to the tester while using the task material, or asked for help in a nonspecific request.

Table 5

Pearson Correlations Between Coders on Problem-solving State Codes

State Code	Correlation Coefficient
Animal House (n=27)	
Time on-task	.95*
Time off-task	.97*
Conceptual Groupings (n=25)	
Time on-task	.95*
Time off-task	.82*

* $p < .001$.

Table 6

Pearson Correlations Between Coders on Problem-solving Event Codes

Event Code	Animal House (n = 27)	Conceptual Groupings (n = 25)
Task talk	.95**	.65**
Impulsive responding	.92**	.40*
Helpless confirmation seeking	.78**	.87**

* $p < .05$.

** $p < .001$.

f. *Helpseeking questioning*: The child asked the tester a question related to the task after attempting to solve the task.

Because of the small number of older children in the study and the varying levels of cognitive abilities, two undergraduate volunteers coded the state and event codes on all the children who completed the tasks. Neither of the coders was aware of group membership or the purpose of the study. When large discrepancies occurred between the coders, the tapes were reviewed with a third coder (myself) and consensus was reached on the frequency counts of the event codes.

As seen in Table 7, some problem-solving strategies were not used with a high frequency. Strategies during specific tasks which were used by less than 30% of the children were dropped from further analyses. These included: task talk, trial and error, helpless confirmation seeking, and helpseeking questioning on the Coding task; impulsive responding and helpless confirmation seeking on the Picture Arrangement task; and task talk, helpless confirmation seeking, and helpseeking questioning on the Raven's Matrices task.

Correlation coefficients between pairs of coders on the state codes (duration in seconds) ranged from .69 to .99 with a median of .95 (Table 8). Correlation coefficients between coders on the event codes (frequency counts) ranged from .74 to .99 with a median of .91 (Table 9).

In order to see whether event codes could be amalgamated across tasks, correlations were performed between event codes across tasks. However, due to the fact that the two groups of children differed on length of time to finish tasks, rate of use of event codes (frequency/total task time in seconds) were used in these analyses. Moderate but significant correlations between rates of event code usage across certain tasks were found: Visual scanning on Picture Arrangement and Raven's Matrices (r (14) = .69, p < .01; alpha = .82),

Table 7

Percent of Older Children who Used Individual Problem-solving Strategies

Event Code	Coding (n = 19)	Picture Arrangement (n = 14)	Raven's Matrices (n = 18)
Task talk	21	64	17
Trial and error	21	93	61
Impulsive responding	42	29	39
Visual scanning	100	100	100
Helpless confirmation seeking	10	21	6
Helpseeking questioning	10	36	6

Table 8

Pearson Correlations Between Coders on Problem-solving State Codes of Older Children

State Code	Correlation Coefficient
Coding (n=19)	
Time on-task	.92**
Time off-task	.81**
Picture Arrangement (n=14)	
Time on-task	.99**
Time off-task	.69*
Raven's Matrices (n=18)	
Time on-task	.99**
Time off-task	.98**

* $p < .01$

** $p < .001$.

Table 9

Pearson Correlations Between Coders on Problem-solving Event Codes of Older Children

Event Code	Coding (n = 19)	Picture Arrangement (n = 14)	Raven's Matrices (n = 18)
Task talk		.95*	
Trial and error		.96*	.80*
Impulsive responding	.96*		.78*
Visual scanning	.74*	.79*	.91*
Helpless confirmation seeking			
Helpseeking questioning		.99*	

* $p < .001$.

trial and error on Picture Arrangement and Raven's Matrices (r (14) = .60, p < .05; alpha = .75), and impulsive responding on Coding and Raven's Matrices (r (18) = .72, p < .01; alpha = .82). For these event codes, frequency of usage was summed across these tasks. Visual scanning on the Coding task, however, was dropped from further analyses because a) low correlations were found between visual scanning on Coding and Picture Arrangement (r (14) = .26, n.s.) and between visual scanning on Coding and Raven's Matrices (r (18) = .17, n.s.); b) coders complained that it was difficult to tell whether children were visual scanning on this task in 42% of the cases; and c) the correlation between coders was the lowest of the intercoder correlations on the event codes (Table 9).

To summarize, therefore, the following problem-solving strategies in the older RO and CB children were evaluated using the average frequency of event code (strategy) usage across the two coders: task talk (Picture Arrangement), trial and error (Picture Arrangement and Raven's Matrices), impulsive responding (Coding and Raven's Matrices), visual scanning (Picture Arrangement and Raven's Matrices) and helpseeking questioning (Picture Arrangement). Helpless confirmation seeking on all tasks was dropped because only a very small proportion of older children used this strategy during problem-solving (Table 7).

Parent-child Interaction

Information gathered from two interaction tasks was used to code different aspects of the parent-child relationship.

A. Free-play interaction. An eight-minute free-play interaction was videotaped, in which the parent and child were presented with a standard basket of toys (including puzzles, construct blocks, Sesame Street clubhouse and people, stuffed animals, books) and were asked to "play together."

Following the eight-minute free-play session, the parent was signaled to leave the child playing alone and go outside the house for a three-minute separation sequence. Upon

return she or he continued to play with the child for another three minutes. These separation and reunion sequences were not analyzed for the present study.

B. Tower of Hanoi. The second videotaped parent-child interaction task involved the Tower of Hanoi (TOH) puzzle (Simon, 1975). This task was administered following the separation and reunion sequence. The TOH task has been used with children five years and older, and has been found to be quite difficult for young children to carry out independently. As well, children as old as 11 years of age could not solve the 3-disk TOH more than half the time (Byrnes & Spitz, 1977). It was chosen, therefore, as a challenging parent-child interaction task, in which the child would require help from the parent. The standard version of the TOH consists of three vertical pegs and a number of doughnut-like disks of graduated diameters to fit on the pegs. At the outset, all the disks are arranged pyramidically on an end peg with the largest disk on the bottom. The task is to move all the disks to the other end peg, subject to two constraints: only one disk can be moved at a time, and at no point can a larger disk be placed on top of a smaller disk. Only the three-disk TOH was used in this study.

During the 3-minute separation sequence when the parent was outside of the house, she or he was given an explanation of how to solve the task by saying "The object of the game is to transfer the pyramid of rings from one end peg to the other end peg, but there are two rules: you can only move one disk at a time (and the disk must be placed on a peg, not held or put on the floor) and you can't put a big disk on top of a smaller disk. We would like you to help your child figure out the game so that he/she may be able to do it on their own, although we're not expecting that your child will be able to solve it as it's quite a hard game. You can show them the game any way you think might help them to understand it. Try to keep them engaged for the four minutes that we'll be taping." Then the parent was shown exactly how to do the task and was asked to perform it so as to assure her or his understanding.

After the reunion sequence, the parent and child were presented with the TOH and were told "Here is another game that mommy/daddy will show you how to play." None of the children in this study were able to complete the task on their own without first requiring the parent's help.

Assessment of the parent-child relationship. Some of the Teaching Task Rating Scales (Egeland & Hiester, 1993) were used to rate various dimensions of parent-child interaction from the videotaped sessions. One parent variable (intrusiveness), three child variables (enthusiasm, experience of the session, and affection toward parent), and a dyadic relationship variable (quality of the relationship) were rated during the free-play session. During the TOH session four parent variables (supportive presence, intrusiveness, confidence, and quality of instruction), four child variables (enthusiasm, experience of the session, persistence, and compliance), and a dyadic relationship variable (quality of the relationship) were rated. All of these variables were rated on 7-point scales, with high ratings (e.g., 6 or 7) indicating a high degree of the particular dimension being rated and low ratings (e.g., 1 or 2) indicating a low degree of the particular dimension. A brief description of each of the scales is provided in Appendix A. In Egeland's sample the average correlation coefficient between two independent raters coding 87 subjects on all scales was .76 (B. Egeland, personal communication, June 6, 1994).

As well, two additional parent variables (warmth, and encouragement of initiative), taken from another rating scale (Marfo, 1994), were coded during the TOH session. These variables were rated on 5-point scales with high ratings indicating a high degree of either warmth or encouragement of initiative and low ratings indicating either low warmth or controlling behavior, respectively. A brief description of these two scales is provided in Appendix A.

Training of coders. Six tapes of RO and CB dyads during both the free-play and the TOH sessions were randomly chosen and sent to Dr. Egeland's laboratory so that his trained coders could review and score the tapes, as well as assess the suitability of the coding system

for the free-play and TOH sessions of this study. They found the coding system to be suitable; however, based on their comments, a decision was made that child variables of persistence and compliance, and the parent variable quality of instruction, were not appropriate for the free-play session.

Training of coders in the present study included familiarization with the Egeland and Hiester coding manual, and then review of the six tapes, of either free-play or TOH sessions, which were scored by the trained coders in Egeland's laboratory. Coders were then required to rate 4 to 6 tapes of sessions not included in their sample of tapes-to-be-coded, until they reached 80% reliability (second coder within one point of first coder considered agreement on the 5- or 7-point scales) on their ratings with the other coders.

Two sets of volunteer coders were trained in pairs, along with a reliability coder for each set. None of the coders was aware of group membership. The first set of coders (five undergraduate students) rated both parent and child variables in either the free-play or the TOH sessions for 25 RO-CB pairs of parent-child dyads. Two independent coders (A and B) each coded 40 videotapes of the TOH session and two other independent coders (C and D) each coded 40 videotapes of the free-play session. A fifth coder (E) coded 15 videotapes from each of the two Free-play coders and 15 videotapes from each of the TOH coders for a total of 30 Free-play videotapes and 30 TOH videotapes. Of the 30 tapes coded by coder E for the TOH session, 10 (5 RO and 5 CB) tapes had been coded by both coder A and B, 10 (5 RO and 5 CB) had been coded by only coder A, and 10 (5 RO and 5 CB) had been coded only by coder B. The proportion of tapes coded by coder E for the Free-play session was identical to those in the TOH session save that the coders were C and D, respectively (Ellwood, 1995).

The second set of coders (9 undergraduate students) rated either the parent or the child variables in either the free-play or the TOH sessions in the remaining 18 RO-CB pairs of parent-child dyads (36 dyads) and the 26 EA parent-child dyads. Therefore, one pair of coders rated 62 dyads on parent variables in the free-play session, while another pair of

coders rated the 62 dyads on child variables in the free-play session. The two pairs of coders for the TOH session did likewise, coding the 62 dyads on either parent or child variables. The reliability coder for this second set rated half of the 62 dyads (29 dyads in the free-play session and 30 dyads in the TOH session) on both parent and child variables. All dyads were therefore double-coded and 50% were coded by three coders.

Reliability of coders. In order to compare intercoder reliability with Egeland's intercoder reliability, Pearson correlations were conducted between pairs of coders. Correlation coefficients ranged from .40 to .65 with a mean of .51 for parent variables on the TOH session and from .61 to .80 with a mean of .69 for child and dyadic variables on the TOH session (Table 10). Correlation coefficients for the free-play session were .49 for the parent variable and ranged from .29 to .55 with a mean of .40 for child and dyadic variables (Table 11). There are several reasons why the correlations in the present sample are lower than those reported by Egeland. First, the rating scale was originally designed for coding behavior during teaching tasks and not free play, which may be the reason for lower reliability on the free-play session than the TOH session in the present study. Second, higher reliability between coders on the child versus parent variables in the present sample may be due to restricted ranges in the present sample on parent variables during both sessions and on child variables during free play compared to ranges in Egeland's sample, as seen in Tables 12 and 13. Egeland's sample consisted of low socioeconomic status mothers in need of help with interactions with their children (B. Egeland, personal communication, June 6, 1994). Perhaps the parents in the present study were more on their guard because of the nature of the study and were therefore able to "look good" for the video camera, while the children acted more themselves, giving greater variability.

A more sensitive assessment of interrater reliability on rating scales is Cohen's kappa (Cohen, 1960; Hunter, 1982) since it corrects for the probability of chance agreement between coders. Kappa levels usually accepted as reflecting adequate levels of inter-coder agreement are set at .60 (Grotevant & Carlson, 1987). Cohen's kappas between coders

Table 10

Pearson Correlations Between Coders on TOH Parent-child Interaction Variables

Variable	Correlation Coefficient
Parent	
Supportive presence	.40*
Intrusiveness	.48*
Quality of instruction	.65*
Confidence	.47*
Warmth	.54*
Encouragement of initiative	.49*
Child	
Persistence	.71*
Enthusiasm	.61*
Compliance	.80*
Experience of session	.65*
Dyadic	
Quality of relationship	.69*

* $p < .001$.

Table 11

Pearson Correlations Between Coders on Free-play Parent-child Interaction Variables

Variable	Correlation Coefficient
Parent	
Intrusiveness	.49**
Child	
Enthusiasm	.37**
Experience of session	.29*
Affection toward parent	.40**
Dyadic	
Quality of relationship	.55**

* $p < .02$.

** $p < .001$.

Table 12

Mean and Standard Deviations of TOH Parent-child Interaction Variables in the Present Sample and in Egeland's Sample

Variable	Present sample		Egeland's sample	
	M	SD	M	SD
	(n = 110)		(n = 283)	
Parent				
Supportive presence	5.2	1.0	4.1	1.3
Intrusiveness	1.6	0.7	2.9	1.4
Quality of instruction	4.6	1.3	3.8	1.2
Confidence	4.9	1.0	4.0	1.4
Warmth	3.0	0.7		
Encouragement of initiative	3.3	0.8		
Child				
Persistence	4.6	1.6	4.5	1.2
Enthusiasm	4.3	1.5	4.3	1.3
Compliance	5.1	1.3	4.5	1.3
Experience of session	4.8	1.1	4.3	1.3
Dyadic				
Quality of relationship	4.7	1.1	4.0	1.4

Table 13

Means and Standard Deviations of Free-play Parent-child Interaction Variables in the Present Sample and in Egeland's Sample

Variable	Present sample		Egeland's sample	
	M	SD	M	SD
	(n = 111)		(n = 283)	
Parent				
Intrusiveness	1.6	0.7	2.9	1.4
Child				
Enthusiasm	5.8	0.7	4.3	1.3
Experience of session	5.7	0.7	4.3	1.3
Affection toward parent	5.4	0.8	4.3	1.2
Dyadic				
Quality of relationship	5.4	0.7	4.0	1.4

(second coder within a point of first coder considered agreement) ranged from .65 to .92 with a median of .73 for the TOH session (Table 14) and from .52 to .94 with a median of .82 for the free-play session (Table 15). The only kappa which did not reach the adequate level was child's affection toward parent (.52) during the free-play session.

Correlations of ratings during free play with corresponding ratings during TOH. Ratings made by all observers coding each dyad, which in 50% of cases was 3 coders and the other 50% of cases was 2 coders, were averaged. Overall, correlations across the free-play and TOH sessions were not very high (mean of .25, ranging from .08 to .48), indicating that the sessions were different, and corresponding scales should not be summed across sessions.

Composite variables. Due to high intercorrelations between certain parent variables during the TOH and high intercorrelations between the child variables during the TOH, and high intercorrelations between child variables during the free-play sessions, composite variables were computed both to reduce the number of variables and to cluster certain rating scales logically. The composite variable called Teaching, which includes maternal variables of supportive presence, quality of instruction, and confidence, had a Cronbach alpha of .89. The composite variable called Enthusiasm, which includes the child variables from the free-play session of enthusiasm, affection toward parent, and experience of the session, had a Cronbach alpha of .87. The composite variable of Engagement, which includes the TOH child variables of compliance, enthusiasm, persistence, and experience of the session, had a Cronbach alpha of .93.

The Home Observation for Measurement of the Environment Inventory (HOME)

The HOME (Caldwell & Bradley, 1984) was administered to each participating family. The HOME Inventory is designed to assess the quality of stimulation and support available to a child in the home environment. Information needed to score the Inventory can be obtained through observation and interview done in the home with the child and the child's primary caregiver. For purposes of this study, the Preschool version of the Inventory was

Table 14

Averaged Cohen's Kappas Between Coders on TOH Parent-child Interaction Variables

Variable	Kappa
Parent	
Supportive presence	.70
Intrusiveness	.74
Quality of instruction	.65
Confidence	.71
Warmth	.92
Encouragement of initiative	.82
Child	
Persistence	.71
Enthusiasm	.70
Compliance	.80
Experience of session	.79
Dyadic	
Quality of relationship	.73

Table 15

Averaged Cohen's Kappas Between Coders on Free-play Parent-child Interaction Variables

Variable	Kappa
Parent	
Intrusiveness	.82
Warmth	.94
Encouragement of initiative	.70
Child	
Enthusiasm	.87
Experience of session	.82
Affection toward parent	.52
Dyadic	
Quality of relationship	.67

used with the 54-month-old children and the Elementary school version was used with the older children. The Preschool version contains 55 items clustered into eight subscales: (a) toys and learning materials, (b) language stimulation, (c) physical environment, (d) pride and affection, (e) stimulation of academic behaviour, (f) encouragement of maturity, (g) variety of stimulation, and (h) acceptance (use of punishment). The Elementary school version contains 59 items clustered into eight subscales: (a) emotional and verbal responsibility, (b) encouragement of maturity, (c) emotional climate, (d) growth fostering materials and experiences, (e) provision for active stimulation, (f) family participation in developmentally stimulating experiences, (g) paternal involvement, and (h) aspects of the physical environment. Brief descriptions of each of the Preschool subscales and the Elementary school subscales are found in Appendices B and C, respectively. Internal consistency and inter-observer agreement have been shown to be high (Caldwell & Bradley, 1984). In the present study, Cronbach alphas across the subscales of the Preschool version and the Elementary school version were .82 and .94, respectively. HOME scores have been moderately to highly correlated with achievement and cognitive measures (Bradley, 1992).

Results

One EA family agreed to the home interview and assessment battery but refused to be videotaped in the free-play and teaching task sequences. Another EA family agreed to be videotaped for the interaction sequences but the child did not want to be videotaped during the assessment; hence this child has scores for performance but not ratings on problem-solving strategies. As well, due to the lengthy assessment battery some children refused to complete the whole battery, which means that although all children were assessed on the Stanford-Binet, some children did not do some or all of the problem-solving tasks or the Bracken.

Because the number of matched pairs of children in each comparison was different, group differences were computed on matched pairs separately for RO-CB, RO-EA, and CB-EA pairs of children. The means of the groups for the paired analyses are presented in the text. However, because correlational analyses within each group were conducted on the maximum number of children in each group, which in some cases (cognitive measures and problem-solving strategies) was more children than in the paired analyses, group means for the entire sample of RO, CB, and EA children whose data are available are presented in Appendix D (performance measures). Appendix E contains group means on 54-month-old children's task orientation and problem-solving strategies.

According to figures provided by the Canadian Ministry of External Affairs, between January 1990 and April 1991, visas were issued to 142 Romanian children to come to British Columbia as Landed Immigrants (Ames, 1997). We had contacted 131 (92%) of these B.C. children and, although not all children met the criteria to fit into either the Romanian Orphanage group or the Early Adopted group, approximately 90% of those who did fit are in this study, as well as 4 children from Washington State. For this reason I feel confident to say that this study includes a large majority of the population of B.C. children who were adopted from Romanian orphanages or who were destined for orphanages had they not been adopted early. As such there is less chance that type I and type II errors will be made in the

following analyses, so it was possible to confidently adopt the $p < .05$ level for the large number of significance tests I performed.

Group Differences on Child Cognitive and Family Measures

In the following analyses, planned contrast Multivariate Analyses of Variance (MANOVAs) were performed on the subscales of the measures using 1-tailed tests predicting RO < CB and RO < EA for the cognitive measures and 2-tailed tests for the family measures. Univariate analyses were computed when the multivariate test was significant, or when there were individual measures to compare instead of subscales, for example, on total IQ, task orientation (composite variable), and on some of the parent-child interaction variables. Means and standard deviations are presented in Tables and Appendices. Effect sizes are displayed as percentile rankings using the CB group as the reference group in the RO-CB and CB-EA comparisons, and the EA group as the reference group in the RO-EA comparisons.

Group Differences on the Stanford-Binet

Fifty-four-month-old RO and CB group differences on the Stanford-Binet. As displayed in Table 16, RO children performed at significantly lower levels on total IQ than CB children. Using Wilks' criterion, the composite verbal comprehension scale was significantly lower in the RO group than the CB group, $F(4, 54) = 11.84$, $p < .001$, and the composite nonverbal reasoning scale was significantly lower in the RO group than the CB group, $F(4, 50) = 4.38$, $p = .004$. Univariate analyses showed that differences were significant on all subscales. Compared to the 50th percentile ranking of the CB group, RO children were at the 2nd percentile on verbal comprehension and at the 14th percentile on nonverbal reasoning. Fifty-four-month-old RO children were scoring at the low end of the Average range (89-110) on overall IQ, and with Average range scores on verbal comprehension. Sixty percent of the children in each group scored in the Average range. The rest of the CB children scored either in the High Average (111-120) or the Superior

Table 16

Stanford-Binet Scores of Matched Pairs of 54-month-old RO and CB Children

	No. of matched pairs	RO Group M	SD	%ile[a]	CB Group[b] M	SD	F
Total IQ	30	91	13	2	109	9	25.04**
Verbal Comprehension	30	96	15	2	119	11	11.84**
Vocabulary	30	49	6	11	59	8	29.09**
Comprehension	30	51	7	9	59	6	19.17**
Memory for sentences	30	47	6	10	56	7	30.61**
Absurdities	29	50	9	4	59	5	23.91**
Nonverbal Reasoning	30	89	10	14	101	11	4.38*
Quantitative	27	48	7	16	54	6	11.91**
Bead Memory	30	45	6	22	50	6.5	7.47*
Pattern analysis	29	44	5	25	48	6	6.47*
Copying	28	41	6	20	46	6	7.94*

* $p < .02$.

** $p < .001$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

(121-131) ranges. In contrast, one RO child (3%) scored in the Superior range, 26% scored in the Low Average (79-88) range, 9% scored in the Slow Learner (68-78) range and one child (3%) scored in the Mentally Retarded (67 and below) range. RO children's nonverbal reasoning IQs were significantly lower than their verbal IQs (t (30) = 3.72, $p < .001$); however, this pattern was also evident in the CB group (t (29) = 6.67, $p < .001$), indicating that both groups of children had more difficulty with tasks assessing spatial orientation and fine-motor coordination than with vocabulary and comprehension tasks.

Fifty-four-month-old RO and EA group differences on the Stanford-Binet. Mean differences between the two groups of Romanian adoptees are displayed in Table 17. EA children scored significantly higher than RO children on total IQ. Using Wilks' criterion, the composite verbal comprehension scale was significantly lower in the RO group than the EA group, $F(4, 45) = 2.37$, $p = .03$. Univariate analyses showed that differences were significant on all verbal subscales. The composite nonverbal reasoning scale was not significantly different between groups, $F(4, 41) = 1.78$, $p = .08$. Compared to the 50th percentile ranking of the EA group, RO children were at the 28th percentile on verbal comprehension and at the 26th percentile on nonverbal reasoning. EA children's scores on their overall, verbal, and nonverbal IQs fell in the middle of the Average range for their age, with verbal IQ significantly higher than nonverbal IQ (t (24) = 4.97, $p < .001$). One EA child (4%) scored in the High Average range and one (4%) in the Superior range, 70% scored in the Average range, 11% scored in the Low Average range, 7% in the Slow Learner range, and one child (4%) scored in the Mentally Retarded range. In contrast, one RO child (4%) scored in the Superior range, 50 % scored in the Average range, 27% in the Low Average range, and 19% scored in the Slow Learner range. Although a significant difference was found on level of father's education between the RO and EA groups, this variable was not significantly related to children's total IQ scores in either the RO ($r(30) = -.04$) or the EA groups (r (24) = .15), so covariate analyses were not carried out.

Table 17

Stanford-Binet Scores of Matched Pairs of 54-month-old RO and EA Children

	No. of matched pairs	RO Group M	SD	%ile[a]	EA Group[b] M	SD	F
Total IQ	26	90	12	32	97	15	3.01*
Verbal Comprehension	26	96	14	28	104	14	2.37*
Vocabulary	26	49	6	33	52	7	7.43**
Comprehension	26	51	7	40	53	8	4.69*
Memory for sentences	23	46	6	16	51	5	3.62**
Absurdities	24	51	8.5	33	54	7	5.89*
Nonverbal Reasoning	25	88	9	26	95	11	1.78
Quantitative	22	48	7.5	27	51	5	0.57
Bead Memory	25	45	6	37	47	6	0.18
Pattern analysis	24	44	5	28	48	7	5.40
Copying	21	41	7	25	45	6	4.08

* $p < .05$.

** $p < .01$.

[a] Percentile ranking with EA group as a reference.

[b] Reference group with mean score at the 50th percentile.

Fifty-four-month-old CB and EA group differences on the Stanford-Binet. Table 18 completes the triangle of comparisons by comparing the Early Adopted group with the Canadian-Born sample. CB children performed at significantly higher levels on overall IQ and on the composite verbal comprehension scale, Wilks' criterion $F(4, 46) = 3.85$, $p = .009$, than EA children. Univariate analyses revealed that differences were significant on all verbal subscales. On the composite nonverbal reasoning scale, however, significance was not reached between the CB and EA groups, Wilks' criterion $F(4, 46) = 2.40$, $p = .06$. Compared to CB children, EA children ranked at the 11th percentile on total IQ and verbal comprehension, and at the 28th percentile on nonverbal reasoning. CB children scored at the high end of the Average range on overall IQ and in the High Average range on verbal IQ.

Older RO and CB group differences on the Stanford-Binet. As seen in Table 19, older RO children also performed at significantly lower levels on total IQ, and on the composite verbal comprehension scale (Wilks' criterion $F (4, 17) = 12.03$, $p < .001$) and composite nonverbal reasoning scale (Wilks' criterion $F (4, 15) = 18.02$, $p < .001$) than the older CB children. Univariate analyses revealed that differences were significant on all subscales. Compared to older CB children, older RO children were ranked below the first percentile on total IQ, verbal comprehension, and nonverbal reasoning, indicating that they were more than three standard deviations away from the reference group. Older RO children's overall IQs fell at the low end of the Slow Learner range, with their verbal IQs at the high end of this range and their nonverbal IQs at the high end of the Mentally Retarded range. Older CB children's overall and nonverbal IQs were in the Average range for their age and their verbal IQs were in the High Average range. Half of the older RO children

Table 18

Stanford-Binet Scores of Matched Pairs of 54-month-old CB and EA Children

	No. of matched pair	CB Group[a] M	CB Group[a] SD	EA Group M	EA Group SD	EA Group %ile[b]	F
Total IQ	25	108	9	97	16	11	8.43**
Verbal Comprehension	25	119	12	104	14	11	3.85**
Vocabulary	25	59	8	52	7	19	7.06*
Comprehension	25	59	6	53	8	16	4.02*
Memory for sentences	22	57	8	51	5	23	7.82**
Absurdities	24	59	5	54	7	16	7.04*
Nonverbal Reasoning	24	101	11	94	12	28	2.40
Quantitative	23	59	6	50	5.5	7	9.00
Bead Memory	24	50	7	47	6	33	4.66
Pattern analysis	24	48	6	48	7	50	0.10
Copying	22	46	6	45	7	43	0.34

* $p < .05$.

** $p < .01$.

[a] Reference group with mean score at the 50th percentile.

[b] Percentile ranking with CB group as a reference.

Table 19

Stanford-Binet Scores of Matched Pairs of Older RO and CB Children

	No. of matched pairs	RO Group M	SD	%ile[a]	CB Group[b] M	SD	F
Total IQ	11	68	14	< 1	106	8	31.48**
Verbal Comprehension	11	76	13	< 1	112	12	12.03**
Vocabulary	11	42	6	1	59	7	38.05**
Comprehension	11	43	4	3	56	7	27.86**
Memory for sentences	11	39	7	3	53	8	27.41**
Absurdities	11	41	8	2	54	6	19.77**
Nonverbal Reasoning	11	66	12	< 1	101	11	18.02**
Quantitative	9	40	8	< 1	52	4	22.73**
Bead Memory	11	33	4	< 1	52	6	54.84**
Pattern analysis	11	35	5	6	49	9	13.01**
Copying	10	36	8	5	47	7	9.43*

* $p < .005$.

** $p < .001$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

scored in the Mentally Retarded range, 25% scored in the Slow Learner range, 16% scored in the Low Average range, and one child (9%) scored in the Average range. In contrast, 82% of older CB children scored in the Average range, with one child (9%) each in the High Average and the Superior ranges. Again children in both the older RO ($t(11) = 4.76$, $p < .001$) and CB ($t(10) = 2.22$, $p < .05$) groups performed better on verbal than on non-verbal tasks. As well, older RO children scored significantly lower than the 54-month-old RO children on overall ($t(41) = 4.89$, $p < .001$), verbal ($t(41) = 4.01$, $p < .001$) and nonverbal IQ ($t(41) = 6.01$, $p < .001$).

Summary of group differences on the Stanford-Binet. After living with their adoptive families for a median of 39 months, 54-month-old RO children had significantly lower overall, verbal, and nonverbal IQs than did CB children the same age. Compared to EA children, RO children had significantly lower overall IQ and verbal IQ, but did not differ significantly on nonverbal IQ. CB children were performing at the high end of the Average range, EA children were performing in the middle of the Average range, and RO children were at the low end of the Average range. Three percent of RO children were above average, while 38% were below average. In the EA group, 8% were above average, and 22% were below average. In contrast, 40% of CB children were above average, with none below average. Older RO children were also significantly behind both their CB matches and the younger RO children, with overall IQs averaging in the Slow Learner range. While 9% of the older RO children were in the Average range, 91% were below average, whereas none of the older CB children were below average and 18% were above average. As well, across all subscales, RO children maintained their positions with the older RO children at the bottom,

next the younger RO children, followed by children in the EA group, with the CB group as a whole ranked highest (Figure 1).

Group Differences on the Bracken Basic Concept Scale

Fifty-four-month-old RO and CB group differences on the Bracken. Using Wilks' criterion, RO children scored significantly lower than CB children on the set of subscales comprising the Bracken, $F(3, 39) = 3.19$, $p = .02$. Univariate analyses indicated that significance was reached on all subscales. Means and percentile rankings are found in Table 20. Compared to CB children, RO children ranked at the 16th percentile on each of the subscales. The majority of RO children and all CB children scored in the average range or above on the Bracken, with only 17% of RO children obtaining School Readiness scores more than one standard deviation below the mean for their age.

Fifty-four-month-old RO and EA group differences on the Bracken. Means and percentile rankings are found in Table 21. Using Wilks' criterion, RO children did not score significantly lower than the EA children on the set of subscales comprising the Bracken, $F(3, 33) = 1.63$, $p = .10$. Univariate analyses revealed, however, a significant difference between groups on the School Readiness Composite, with the RO children ranked at the 16th percentile compared to EA children. All EA children scored in the average range or higher on the Bracken.

Fifty-four-month-old CB and EA group differences on the Bracken. No group differences were found on the combined subscales of the Bracken, Wilks' criterion $F(3, 42) = .60$, $p = .62$. Means and percentile rankings are found in Table 22.

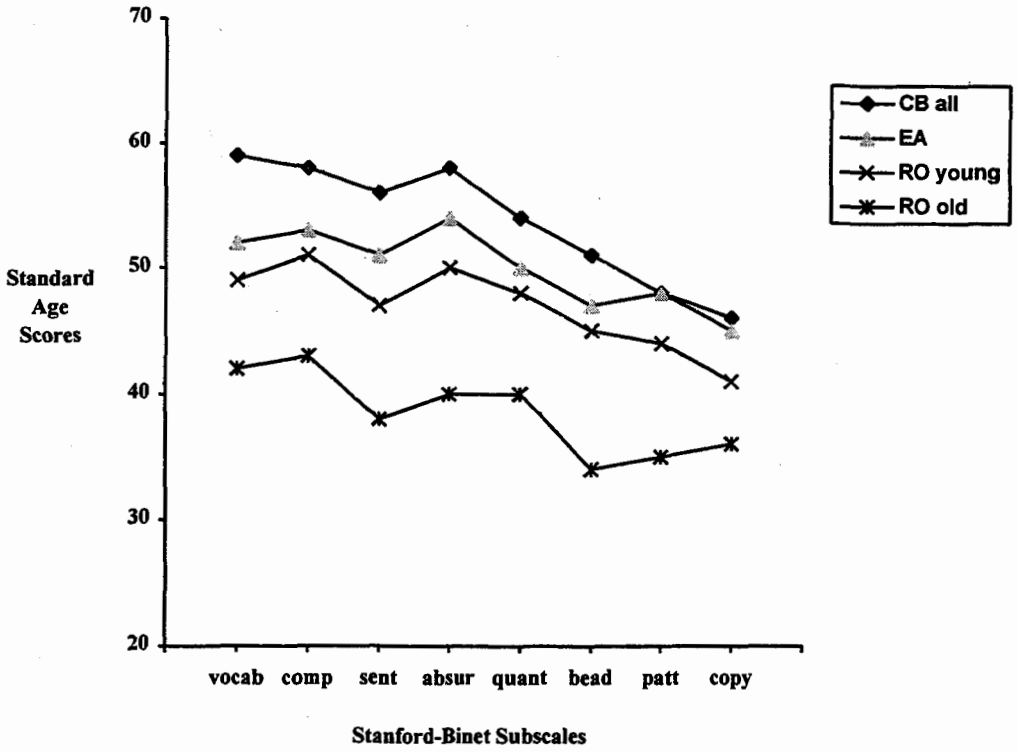

Figure 1. Stanford-Binet standard age scores for each group of children (older RO children, 54-month-old RO children, EA children, and all CB children grouped together) by subscale.

Note: Vocab = Vocabulary; Comp = Comprehension; Sent = Memory for Sentences; Absur = Absurdities; Quant = Quantitative; Bead = Bead Memory; Patt = Pattern Analysis; Copy = Copying.

Table 20

Bracken Scores of Matched Pairs of 54-month-old RO and CB Children

	No. of matched pairs	RO Group M	SD	%ile[a]	CB Group[b] M	SD	F
School Readiness Composite	22	9	3	16	12	3	8.51**
Time/sequence	15	9	3	16	11	2	5.96*
Direction/position	16	10	3	16	12	2	9.58**

*$p < .01$.

**$p < .005$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 21

Bracken Scores of Matched Pairs of 54-month-old RO and EA Children

	No. of matched pairs	RO Group M	SD	%ile[a]	EA Group[b] M	SD	F
School Readiness Composite	18	9	3	16	11	2	4.87*
Time/sequence	11	9	4	25	11	3	1.22
Direction/position	13	10	3	20	12	3	1.92

* $p < .01$.

[a] Percentile ranking with EA group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 22

Bracken Scores of Matched Pairs of 54-month-old CB and EA Children

	No. of matched pairs	CB Group[a]		EA Group			F
		M	SD	M	SD	%ile[b]	
School Readiness Composite	21	12	3	12	2	43	1.15
Time/sequence	18	12	2	11	2	31	1.21
Direction/position	19	13	2	11	3	16	1.82

[a] Reference group with mean score at the 50th percentile.

[b] Percentile ranking with CB group as a reference.

Older RO and CB group differences on the Bracken. Older RO children performed significantly lower than CB children on the set of subscales comprising the Bracken, Wilks' criterion $F(3, 14) = 8.29$, $p = .001$. Univariate tests indicated that significance was reached on all three subscales (Table 23). Compared to CB children, RO children were ranked at the 1st percentile on the School Readiness Composite and the direction/position subscale, and at the 2nd percentile on the time/sequence subscale. Older RO children scored significantly lower than younger ROs on the School Readiness Composite ($t(31) = 2.88$, $p < .01$) and the two subscales of the Bracken (time/sequence: $t(24) = 2.46$, $p < .03$; position/direction: $t(25) = 2.98$, $p < .01$). All older CB children scored in the average to above average range, while 56% of the RO children obtained scores more than one standard deviation below the mean on the School Readiness Composite.

Summary of group differences on the Bracken. Both younger and older RO children had less understanding than CB children of basic concepts of letters, numbers, colors, and concepts related to direction, position, time, and sequence. Fifty-four-month-old RO children did not differ from EA children on their knowledge of time and position concepts, and performed within the average range on all the subscales of the Bracken. Older RO children scored lower than the fifty-four-month-old RO children, and the majority of older RO children obtained below average scores on the School Readiness Composite. Overall, the groups of children maintained their positions with the older RO children at the bottom, next the younger RO children, followed by children in the EA group, with the CB group as a whole ranked highest (Figure 2).

Table 23

Bracken Scores of Matched Pairs of Older RO and CB Children

	No. of matched pairs	RO Group M	SD	%ile[a]	CB Group M	SD	F
School Readiness Composite	8	6	2	1	11	2	13.54**
Time/sequence	7	6	4	2	13	4	10.56*
Direction/position	7	7	2	1	12	2	25.04**

* $p < .005$.

** $p < .001$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

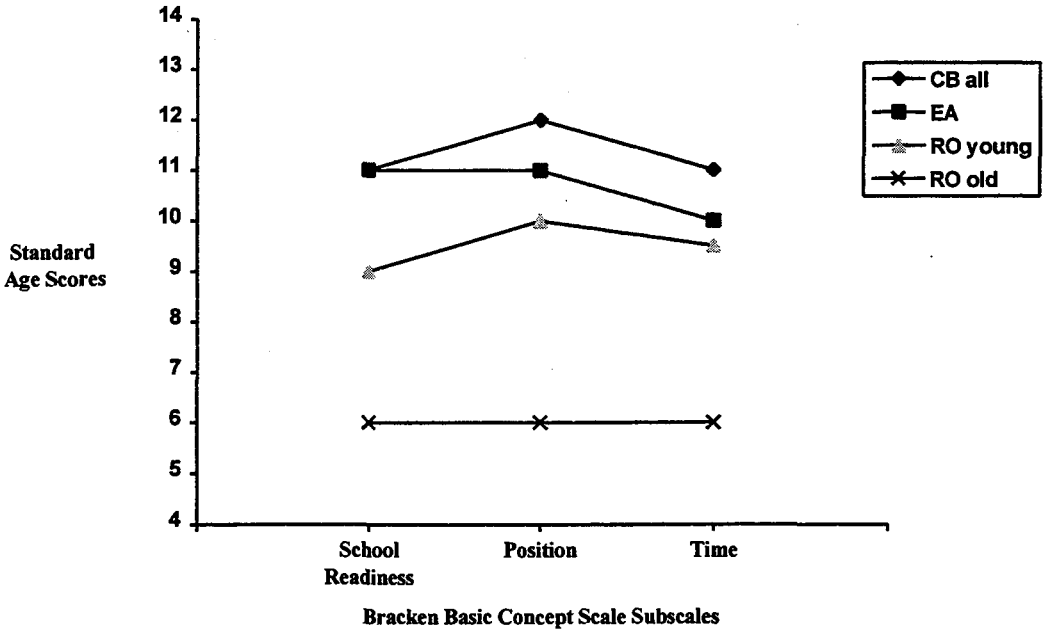

Figure 2. Bracken Basic Concept Scale standard age scores for each group of children (older RO children, 54-month-old RO children, EA children, and all CB children grouped together) by subscale.

Consistent with RO children's scores on the School Readiness Composite, 77% of the parents of 54-month-old RO children who were planning to send their children to kindergarten planned to do this at the usual chronological age for kindergarten entrance. Of the older children who were enrolled in school (one was being home-schooled), half were in the usual grade for their age, and the other half were either one or two years behind.

Group Differences on Problem-solving Task Performance

Fifty-four-month-old group differences on the Animal House task. RO children not only performed significantly less well on the Animal House task than CB children, but also took longer than CB children to complete the task (Table 24). Compared to Early Adopted children, RO children also performed less well and took significantly longer to finish the task (Table 25). As seen in Table 26, CB and EA children's problem-solving task performance did not differ, nor did their time to complete the task.

Older RO and CB group differences on problem-solving performance. As seen in Table 27, although time to finish any of the tasks did not differ significantly between groups, older RO children performed less well than CB children on all three problem-solving tasks.

Summary of group differences on problem-solving task performance. Both younger and older RO children performed less well than both comparison groups on the problem-solving tasks.

Group Differences on Problem-solving Strategies

Fifty-four-month-old group differences. I also hypothesized that orphanage experience would negatively affect the way children approached and attempted to solve tasks.

Table 24

Problem-solving Performance of Matched Pairs of 54-month-old RO and CB Children

	No. of matched pairs	RO Group M	RO Group SD	RO Group %ile[a]	CB Group[b] M	CB Group[b] SD
Problem-solving Task						
Animal House*	28	15	5	< 1	19	2
Time to finish (sec.)*	28	299	81	84	227	73

* $p < .005$

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 25

Problem-solving Performance of Matched Pairs of 54-month-old RO and EA Children

	No. of matched pairs	RO Group M	RO Group SD	RO Group %ile[a]	EA Group[b] M	EA Group[b] SD
Problem-solving Task						
Animal House*	22	16	5	16	19	3
Time to finish (sec.)*	22	307	87	72	256	90

*$p < .01$.

[a] Percentile ranking with EA group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 26

Problem-solving Performance of Matched Pairs of 54-month-old CB and EA Children

	No. of matched pairs	CB Group[a]		EA Group		
		M	SD	M	SD	%ile[b]
Problem-solving Task						
Animal House	22	19	2	19	3	50
Time to finish (sec.)	21	233	85	257	93	61

[a] Reference group with mean score at the 50th percentile.

[b] Percentile ranking with CB group as a reference.

Table 27

Problem-solving Performance of Matched Pairs of Older RO and CB Children

	No. of matched pairs	RO Group M	RO Group SD	RO Group %ile[a]	CB Group[b] M	CB Group[b] SD
Coding						
Performance*	8	20	16	5	38	11
Time to finish (sec.)	8	213	36	79	184	37
Picture Arrangement						
Performance*	4	5	2	7	8	2
Time to finish (sec.)	4	643	232	86	521	115
Raven's Matrices						
Performance*	7	10	2	16	16	6
Time to finish (sec.)	7	216	36	81	184	37

* $p < .05$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Note: Three additional RO children attempted but could not understand the Picture Arrangement task.

As seen in Tables 28 and 29, 54-month-old RO children were less task-oriented than both their CB and EA matches during the administration of the Stanford-Binet. RO children did not differ from CB or EA children on their activity level during test administration, on whether they took over the tasks instead of waiting to be told what to do, or on whether they were quick to respond or needed urging. The difference in overall score on task orientation does indicate, however, that RO children were less attentive and more distractible, were not persistent, and did not react realistically to failure. They were also not very eager to continue, and seemed to prefer easy tasks.

During the Animal House task, although the percentage of off-task behavior did not differ between pairs of groups (Tables 28 and 29), RO children differed in the frequency of their combined use of event codes (task talk, impulsive responding, helpless confirmation seeking) compared to CB (Wilks' criterion $F(3, 56) = 8.71$, $p < .001$) and EA (Wilks' criterion $F(3, 41) = 3.03$, $p = .04$) children. Univariate analyses revealed that RO children were more impulsive in their responding than CB children, and used helpless confirmation seeking more often than both CB and EA children. As seen in Table 30, there were no differences between CB and EA children's task orientation or problem-solving strategies (Wilks' criterion $F(3, 41) = 1.61$, $p = .20$) on Animal House.

Older RO and CB group differences. As with the younger sample, older RO children ($M = 22$, $SD = 9$) were less task oriented during the SB4 than older CB children ($M = 34$, $SD = 3$; $t(10) = 4.10$, $p < .01$), with significant differences on seven of the eight subscales that make up the scale. The only nonsignificant difference between groups on the subscales

Table 28

Problem-solving Strategies of Matched Pairs of 54-month-old RO and CB Children

	No. of matched pairs	RO Group M	SD	%ile[a]	CB Group[b] M	SD	F
Stanford-Binet							
Task orientation	30	24	8	16	30	6	8.53*
Animal House	28						
Percent off-task		3	4	56	2	7	1.06
Task talk		5	6	50	5	5	.03
Impulsive responding		6	5	77	3	4	11.33*
Helpless confirmation seeking		3	4	>99	0	1	18.76*

*$p < .001$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 29

Problem-solving Strategies of Matched Pairs of 54-month-old RO and EA Children

	No. of matched pairs	RO Group M	SD	%ile[a]	EA Group[b] M	SD	F
Stanford-Binet							
Task orientation	26	24	8	31	28	7	5.02*
Animal House	21						
Percent off-task		4	4	43	3	7	0.07
Task talk		5	6	44	6	7	0.01
Impulsive responding		7	4	69	5	4	1.77
Helpless confirmation seeking		4	4	93	1	2	7.59**

*$p < .05$.

**$p < .005$.

[a] Percentile ranking with EA group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 30

Problem-solving Strategies of Matched Pairs of 54-month-old CB and EA Children

	No. of matched pairs	CB Group[a] M	CB Group[a] SD	EA Group M	EA Group SD	EA Group %ile[b]	F
Stanford-Binet							
Task orientation	26	29	6	27	6	37	0.96
Animal House	21						
Percent off-task		3	7	5	10	61	0.31
Task talk		5	6	5	6	50	0.06
Impulsive responding		2	4	5	4	77	2.10
Helpless confirmation seeking		0.3	1	1	2	76	3.95

[a] Reference group with mean score at the 50th percentile.

[b] Percentile ranking with CB group as a reference.

was on whether children were quick to respond or needed urging. This indicates that RO children were less attentive and more distractible, were more active, took over instead of waited to be told what to do, were not persistent, did not react realistically to failure, and seemed to prefer easy tasks.

Using nonmatched samples (Table 31), older RO and CB children did not differ on how much time they spent off-task. Because of positively skewed distributions of frequency of event codes in the CB group, the z for differences in proportion of children using event codes more than once (Table 32) was used in the following analyses. Although there was no difference in the proportion of RO children compared to CB children using trial and error and visual scanning, older RO children were more likely to use task talk, be impulsive in their responding, and use helpseeking questioning than CB children. There were no age differences between groups in these unmatched analyses.

To maximize the number of older children in the group difference analyses on problem-solving strategies, I have presented in Table 32 proportions and comparisons on unmatched samples; the proportions on matched pairs of older RO and CB children are found in Appendix F. With smaller sample sizes in the matched analyses, differences disappeared between RO and CB children on use of task talk or helpseeking questioning. RO children were still more likely to be impulsive in their responding, however.

Group Differences on Parent-child Interaction Variables

Fifty-four-month-old group differences. There were no differences between the pairs of groups of younger children on any of the parent-child interaction variables. Using Wilks' criterion and 2-tailed tests, RO parent behaviors on the Tower of Hanoi (TOH) task were not

Table 31

Older Children's Off-task Behavior on the Problem-solving Tasks

	RO Group				CB Group[b]		
	n	M	SD	%ile[a]	n	M	SD
Percent off-task							
Coding	10	5	10	---	9	0	0
Picture Arrangement	6	3	4	65	8	1.5	4
Raven's Matrices	9	5	9	0	9	0.5	1

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 32

Percent of Older RO and CB Children using Problem-solving Strategies

	RO Group		CB Group	
Event code	n		n	
Task talk*	6	100	8	25
Impulsive responding*	9	67	9	11
Trial and error	6	100	8	88
Visual scanning	6	100	8	100
Helpseeking questioning*	6	67	8	0

*$p < .01$.

different from those of CB parents ($F(4, 55) = .72$, $p = .58$) or EA parents ($F(4, 42) = 1.39$, $p = .26$). Two-tailed matched t-tests were performed on all other interaction variables. Matched group means are found in Appendices G, H, and I. During the teaching task, parents in all groups scored near the mid-point of the scale on the Teaching composite variable, were either not intrusive or very low on intrusiveness, and moderate on warmth and encouragement of initiative, and children were moderately engaged in the task. Ratings of quality of the relationship were on the positive side during the teaching task, and even more positive during the free-play session. During free play, parents were again very low on intrusiveness, and children were rated toward the high end of the scale on enthusiasm.

Older RO and CB group differences. As seen in Table 33, differences between RO and CB groups on parent-child interaction variables were evident with the older children. Wilks' criterion was nearly significant at my *a priori* level for the combined TOH parent variables ($F(4, 17) = 2.67$, $p = .07$), and univariate analyses revealed that parents of RO children were more intrusive with their children on the teaching task than parents of CB children, and this was also true in the free-play session. It should be noted, however, that the mean rating for the RO group was still very low on intrusiveness, indicating that intrusiveness was not pervasive, was of low intensity, although some redirecting was done in a poorly timed fashion. During the teaching task, parents of RO children also encouraged their children's intiative less than CB parents, RO children were less engaged in the task than CB children, and the quality of the relationship was rated as less positive in the RO dyads than in the CB dyads. The quality of the relationship in the RO dyads was higher in the free-play session than during the teaching task ($t(11) = 3.42$, $p < .01$), however, and not different

Table 33

Parent-Child Interaction Ratings of 11 Matched Pairs of Older RO and CB Children

	RO Group			CB Group[b]		F
	M	SD	%ile[a]	M	SD	
Teaching Task (TOH)						
Parent variables						
Teaching	13.9	2.8	45	14.3	3.3	0.96
Intrusiveness	2.2	0.7	99	1.3	0.4	10.74**
Warmth	2.8	0.7	37	3.0	0.6	0.48
Encouragement of initiative	3.0	0.7	11	4.0	0.8	7.80*
Child variables						
Engagement	18.1	6.2	14	22.3	3.8	5.71*
Dyadic variable						
Quality of the relationship	4.2	1.1	11	5.3	0.9	6.50*
Free play						
Parent variable						
Intrusiveness	1.8	0.6	95	1.3	0.3	6.10**
Child variable						
Enthusiasm	17.2	2.2	66	16.2	2.5	0.83
Dyadic variables						
Quality of the relationship	5.3	0.6	64	5.2	1.1	0.01

*$p < .05$.

**$p < .005$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

from the ratings for the CB dyads during the free-play session. As well, in this session RO and CB children did not differ on their enthusiasm.

Group differences on HOME scores

Fifty-four-month-old group differences. Although families were matched on demographic variables, it was important to examine whether there were differences between groups in the quality of the environment to which the children were exposed. There were few significant differences between the pairs of younger groups of children on the Preschool version of the HOME, with scores in all groups at the high end of the scale. Mean scores on the HOME and its subscales for the RO and CB groups are presented in Table 34. RO children had lower total scores than CB children, whereas EA children ($M = 47$, $SD = 3.60$) did not differ from either group. Using Wilks' criterion, significance was not reached on the combined subscales of the HOME between RO and CB groups ($F(8, 51) = 1.47$, $p = .19$); however, univariate analyses were examined to see whether certain subscales related to cognitive development were different. RO children had lower scores on the subscales of language stimulation and stimulation of academic behavior, and on acceptance than CB children. RO-EA and CB-EA group means on the HOME subscales are found in Appendices J and K, respectively.

Older RO and CB group differences. Table 35 displays mean scores for the older children on the School-age version of the HOME. RO children's total scores were moderate, but significantly lower than CB children's total scores. Using Wilks' criterion, RO children's combined subscale scores were lower than CB children's, $F(8, 13) = 8.82$, $p < .001$. Univariate analyses revealed that RO scores were significantly lower than CB scores on the

Table 34

HOME Scores of 31 Matched Pairs of 54-month-old RO and CB Children

	RO Group			CB Group[b]		F
	M	SD	%ile[a]	M	SD	
Total HOME Score	46.1	4.2	30	48.0	3.6	5.95*
Toys and learning materials	9.2	1.3	47	9.1	1.5	0.01
Language stimulation	6.6	0.8	16	6.9	0.3	5.03*
Physical environment	6.7	1.1	7	7.0	0.2	1.66
Pride and affection	5.1	1.1	50	5.1	0.8	0.16
Stimulation of academic behavior	3.9	1.2	25	4.5	0.9	5.60*
Encouragement of maturity	3.1	1.1	39	3.4	1.1	1.34
Variety of stimulation	8.0	0.9	50	8.0	1.0	0.19
Acceptance	3.5	0.6	16	3.8	0.3	5.28*

*$p < .05$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

Table 35

HOME Scores of 11 Matched Pairs of Older RO and CB Children

	RO Group			CB Group[b]		F
	M	SD	%ile[a]	M	SD	
Total HOME Score	43.3	7.0	8	49.6	4.5	8.82*
Emotional/verbal responsibility	8.3	1.5	50	8.3	1.3	0.19
Encouragement of maturity	5.1	1.5	34	5.6	1.2	0.87
Emotional climate	5.5	1.8	47	5.6	1.3	0.08
Growth fostering materials and experiences	5.0	1.5	12	6.3	1.1	5.21*
Provision of active stimulation	5.3	1.7	16	6.6	1.3	4.38*
Family participation in stimulating experiences	4.8	1.0	8	5.5	0.5	4.71*
Paternal involvement	2.0	0.6	< 1	3.7	0.6	40.11**
Physical environment	7.4	0.8	5	7.9	0.3	4.39*

*$p < .05$.

**$p < .01$.

[a] Percentile ranking with CB group as a reference.

[b] Reference group with mean score at the 50th percentile.

subscales of growth fostering materials and experiences, provision of active stimulation, family participation in stimulating experiences, paternal involvement, and physical environment.

Predictors of Progress Post-adoption

Due to the large number of correlational analyses in the following section, it was decided that not all significant correlations would be discussed. Only when a pattern emerged, for example when two or more of the cognitive measures were significantly related to quality of the home environment or one of its subscales in the older RO children was mention made of a relationship between cognitive performance and the HOME. In this way, the significance of sporadic correlations was not inflated.

Relation of Antecedent Variables to Cognitive Performance at Time 2

Relation between institutional variables and cognitive performance in RO children. Few institutional variables were statistically significant predictors of development. Whether toys had been present in the orphanage for the children to play with, whether children had been dirty or soiled when first met by adoptive parents, and whether the child had been a favorite of a caregiver were not related to children's cognitive scores. The only variable that was related to how well RO children were doing at Time 2 was length of institutional stay (Table 36), with more extensive time in orphanage related to lower cognitive scores.

Relation between initial child variables and cognitive performance in RO children. A number of initial child variables were also examined to see whether they predicted children's progress at Time 2. Neither health of the child when parents first met them nor birthweight were related to children's cognitive scores. Table 36 indicates, however, that the number of

Table 36

Correlations of Time in Institution and Earlier Developmental Status Variables with Cognitive Performance in the RO sample

	Time in Institution	Number of R-DPDQ Delays	Gesell AQ
Full sample			
Stanford-Binet IQ	-.66**	-.75**	.60**
Verbal comprehension	-.60**	-.75**	.47*
Nonverbal reasoning	-.71**	-.69**	.65**
Bracken School Readiness	-.45**	-.53**	.32
Time subscale	-.49*	-.56**	.10
Position subscale	-.55**	-.69**	.72*
54-month-old children			
Animal House performance	-.14	-.38	-.07
Older children			
Coding performance	.20	-.24	-
Picture Arrangement performance	-.03	-.30	-
Raven's Matrices performance	.03	.06	-

* $p < .05$.

** $p < .01$.

delays parents reported their children to have at Time 1 on the Revised Denver Prescreening Developmental Questionaire (R-DPDQ) was significantly related to children's cognitive scores at Time 2, with delays in more areas related to lower scores. As well, for the younger children who had been in the BC Infant Development Programme, their Gesell quotients in the area of adaptive development (AQ), one of the 5 areas assessed and the closest one to intellectual development, were positively related to their Stanford-Binet scores.

Relation of Antecedent Variables and Problem-solving Strategies at Time 2

Relation between institutional variables and problem-solving strategies in RO children. Institutional variables were not related to RO children's problem-solving strategies. Favoritism, presence of toys, and dirtiness reported by parents were not related to children's use of strategies, and length of institutional stay was not related to task orientation or problem-solving strategies in the RO sample. Correlations between time in institution and RO children's problem-solving strategies can be found in Appendix L.

Relation between initial child variables and problem-solving strategies in RO children. Child's birthweight and health when parents first met the child were not related to RO children's problem-solving strategies. Correlations between Time 1 developmental status variables and RO children's problem-solving strategies are found in Appendix L. Gesell quotients in the area of adaptive development (AQ) were also not related to RO children's problem-solving strategies. Parents' reports of the number of delays their children had at Time 1 on the R-DPDQ were related to task orientation ($r(39) = -.42$, $p < .01$), with more delays related to less task oriented behavior. Older children with more areas of delay were less likely to use helpseeking questioning ($r(6) = -.94$, $p < .01$). However, when one child

with the fewest delays was dropped from the analysis, the correlation became nonsignificant ($r(5) = .06$).

Relationships Between Current Family Variables and Children's Cognitive Development

Relation between demographic variables and children's cognitive performance. Table 37 displays correlations between RO children's cognitive scores and family socioeconomic status (SES) and income, parents' ages, parents' levels of education. RO children living with families of higher SES scored higher on the Stanford-Binet, the Bracken, and the problem-solving tasks than children living with families of lower SES, and RO children of older fathers were doing better on the Bracken than RO children of younger fathers. Level of parental education was not related to children's cognitive scores except for the problem-solving task in the 54-month-old children. These results are consistent with the significant correlations found in the CB sample as seen in Table 38 and to some extent to correlations in the EA sample as seen in Table 39. In general, CB and EA children's Stanford-Binet and Bracken scores were positively related to SES, and their Bracken scores were also positively related to fathers' ages.

Relation between demographic variables and children's problem-solving strategies. Correlations between family variables and RO children's problem-solving strategies are found in Appendix M. RO children's task orientation was not related to any family demographic variables and their problem-solving strategies were also not related to family SES, income, parents' ages, or fathers' level of education. Fifty-four-month-old RO children of more educated mothers ($r(31) = -.47$, $p < .01$), however, were less impulsive in their problem-solving. These results were consistent with the direction of correlations within the

Table 37

Correlations between Family Variables and Cognitive Performance in the RO Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Full sample						
Stanford-Binet IQ	.31*	.09	-.05	-.04	.21	.12
Verbal comprehension	.29	.07	-.08	-.004	.23	.13
Nonverbal reasoning	.32*	.11	-.03	-.11	.15	.06
Bracken School Readiness	.32	.01	-.08	-.02	.30	.43*
Time subscale	.48*	.31	.11	.04	.36	.48*
Position subscale	.31	.02	-.01	.01	.35	.46*
54-month-old children						
Animal House performance	.47**	-.08	.31**	.32**	.32	.19
Older children						
Coding performance	.24	.87**	.20	.22	.53	.82**
Picture Arrangement performance	.12	.88**	.12	.16	.53	.76*
Raven's Matrices performance	.74*	.30	.41	.78*	.46	.46

* $p < .05$.

** $p < .01$.

Table 38

Correlations between Family Variables and Cognitive Performance in the CB Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Full sample						
Stanford-Binet IQ	.33*	.09	-.01	.02	.17	.27
Verbal comprehension	.37*	.16	.32*	.30	.00	.23
Nonverbal reasoning	.18	.04	-.19	-.15	.20	.14
Bracken School Readiness	.40*	.18	.07	.02	.11	.33*
Time subscale	.47**	.02	-.17	-.03	.28	.46**
Position subscale	.44**	.00	.12	.13	.25	.51*
54-month-old children						
Animal House performance	.35	.18	.28	.12	.26	.19
Older children						
Coding performance	-.58	.14	.26	.03	-.27	.61
Picture Arrangement performance	-.54	.21	.27	-.13	-.45	-.02
Raven's Matrices performance	-.34	.23	-.14	-.17	-.17	.00

* $p < .05$.

** $p < .01$.

Table 39

Correlations between Family Variables and Cognitive Performance in the EA Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Stanford-Binet IQ	.24	-.17	-.03	.15	.24	.01
Verbal comprehension	.25	-.04	.05	.09	.10	-.07
Nonverbal reasoning	.35	-.12	.17	.11	.20	.00
Bracken School Readiness	.38	-.04	.22	.38	.53*	.31*
Time subscale	.46*	.03	.50*	.24	.25	.12
Position subscale	.28	-.03	.53*	.25	.22	-.01
Animal House performance	.18	.05	.25	.00	.29	.34

* $p < .05$.

CB sample (Appendix N) and the EA sample (Appendix O). However, it was father's level of education which was significantly related to impulsive responding in the EA sample ($r(22) = -.50$, $p < .05$). Older RO children who used more visual scanning during problem-solving came from families with higher incomes ($r(6) = .87$, $p < .05$), and older fathers ($r(6) = .98$, $p < .05$). These relationships were not found within the older CB sample[1].

Relation between quality of the home environment and 54-month-old RO children's cognitive performance. As seen in Table 40, total HOME scores in the RO sample were significantly and positively related to children's cognitive scores. Correlations between HOME subscales and RO children's cognitive scores are found in Appendix P. Although generally positively related to all subscales except toys, children's cognitive scores were significantly related to the subscale of academic stimulation, which assesses the amount of encouragement the child receives for academic issues. There were also some correlations of cognitive scores with physical environment which evaluates whether the living space is adequate for the number of people in the family and the surrounding environment is safe. When one child with exceptionally low scores on physical environment was removed from the analysis, however, correlations between physical environment and RO children's Stanford-Binet IQs and performance on Animal House became statistically nonsignificant.

Relation between quality of the home environment and 54-month-old CB children's cognitive performance. Correlations between total HOME scores and Stanford Binet scores in the CB sample (Table 40) were much lower and fewer of them were statistically

[1] In the older CB sample, the only problem-solving strategies which the children used more than once were trial and error and visual scanning. For this reason, only correlations with these two strategies are presented in all the following older CB sample analyses.

Table 40

Correlations between Total HOME Scores and Cognitive Scores in the 54-month-old Children

	RO HOME	CB HOME	EA HOME
Stanford-Binet IQ	.49**	.20	.66**
Verbal comprehension	.46**	.25	.66**
Nonverbal reasoning	.43*	.09	.50*
Bracken School Readiness	.70**	.47*	.61**
Time subscale	.62**	.41*	.53*
Position subscale	.52*	.38	.53*
Animal House performance	.67**	.67**	.02

* $p < .05$.

** $p < .01$.

significant than the RO sample. This indicates that CB children's cognitive scores were not related as much to the current quality of their homes. Differences between correlations in the RO and CB groups were marginally significant for the correlation between total IQ and HOME scores (Pearson Filon $z = 1.22$, $p = .06$); and significant for the correlation between nonverbal IQ and HOME scores ($z = 1.39$, $p < .05$). The correlation between verbal IQ and HOME scores in the RO sample was not significantly different from that in the CB sample. Correlations between HOME subscales and CB children's cognitive scores are found in Appendix Q. Only the subscale of academic stimulation was consistently related to CB children's cognitive scores.

Relation between quality of the home environment and 54-month-old EA children's cognitive performance. Correlations between total HOME scores and cognitive scores in the EA sample as seen in Table 40 were consistently positive, and significant for the Stanford-Binet and Bracken but not the problem-solving task. Correlations were larger than correlations in the CB sample and significantly higher for the correlation between total IQ and HOME scores ($z = 1.98$, $p < .05$); for the correlation between verbal IQ and HOME scores ($z = 1.95$, $p < .05$); and for the correlation between nonverbal IQ and HOME scores ($z = 1.53$, $p < .05$). As seen in Appendix R, both the subscales of language stimulation and academic stimulation, and to some extent toys and variety of stimulation, were consistently and significantly related to children's cognitive scores with better quality stimulation related to higher scores.

Summary of the relationship between quality of the home environment and 54-month-old children's cognitive performance. As hypothesized, quality of the home environment was

significantly related to children's cognitive scores. For the two groups adopted from Romania, correlations were all strongly positive. It is clear that RO and EA children whose parents had provided them with a generally stimulating and supportive environment had children who were doing better on IQ tests, both verbal and non-verbal. For the CB children, there was little or no relationship between the amount of stimulation and support provided in their homes and how high their IQs were.

Relation between quality of the home environment and 54-month-old RO children's problem-solving strategies. Correlations between RO children's problem-solving strategies and total HOME scores are presented in Table 41, and the correlations with HOME subscales are found in Appendix S. RO children's use of impulsive responding was negatively related to their total HOME score. RO children's task orientation, although not significantly related to their total HOME score (Table 41), was positively related (Appendix S) to the subscales of academic stimulation ($r(31) = .38$, $p < .05$) and variety of toys available to the child ($r(31) = 42$, $p < .05$).

Relation between quality of the home environment and 54-month-old CB children's problem-solving strategies. CB children's task orientation was positively related to their total HOME score and their use of impulsive responding was negatively related to their total HOME score (Table 41). Correlations between CB children's problem-solving strategies and HOME subscales are found in Appendix T. CB children living in homes with more language and academic stimulation were more task oriented ($r(30) = .44$, $p < .05$ and $r(30) = .41$, $p < .05$, respectively), less impulsive ($r(30) = -.49$, $p < .05$ and $r(30) = -.51$, $p < .01$, respectively),

Table 41

Correlations between Total HOME Scores and Problem-solving Strategies in the 54-month-old Children

	RO HOME	CB HOME	EA HOME
Task orientation	.30	.42*	.65**
Impulsive responding	-.35*	-.37*	-.42*
Helpless confirmation seeking	.15	-.32	.02

* $p < .05$.

** $p < .01$.

and used helpless confirmation seeking less often ($r(30) = -.39$, $p < .05$ and $r(30) = -.41$, $p < .05$, respectively) in their problem-solving.

Relation between quality of the home environment and 54-month-old EA children's problem-solving strategies. The correlations between EA children's problem-solving strategies and task orientation and their total HOME scores (Table 41) are consistent with the correlations found within the CB sample, that is, EA children living in homes with higher HOME scores were more task oriented and less impulsive in their responding. Correlations between HOME subscales and children's problem-solving strategies are found in Appendix U. EA children living in homes with more language and academic stimulation were more task oriented ($r(26) = .57$, $p < .01$ and $r(26) = .51$, $p < .01$, respectively) and less impulsive ($r(22) = -.52$, $p < .05$ and $r(22) = -.54$, $p < .01$, respectively) in their problem-solving.

Summary of the relation between quality of the home environment and 54-month-old children's problem-solving strategies. Consistent with the positive relations between living in homes with high HOME scores and children's cognitive performance, children living in more stimulating homes were more task oriented and less impulsive in their problem-solving, regardless of their background. The subscales of language and academic stimulation provided the best and most consistent correlations. There were no differences among the groups in the magnitude of the correlations.

Relation between quality of the home environment and older children's cognitive performance. Similar RO-CB differences in the relationship between quality of the home environment and children's cognitive scores were found in the sample of older children using the School-age version of the HOME, as displayed in Table 42. RO children's Stanford-

Table 42

Correlations between Total HOME Scores and Cognitive Scores in Older Children

	RO		CB	
	n	HOME	n	HOME
Stanford-Binet IQ	12	.64*	11	.13
Verbal comprehension	12	.75**	11	.45
Nonverbal reasoning	12	.55	11	-.11
Bracken School Readiness	9	.34	11	.24
Time subscale	8	.61	11	.06
Position subscale	8	.37	11	.29
Coding performance	10	.39	9	.30
Picture Arrangement performance	9	.35	7	.24
Raven's Matrices performance	9	.42	9	.31

* $p < .05$.

** $p < .01$.

Binet scores were positively related to their total HOME scores whereas the same correlations were non-significant in the CB sample. Correlations between HOME subscales and older RO and CB children's cognitive scores are found in Appendices V and W, respectively. The subscale of encouragement of maturity was positively related to RO children's verbal comprehension and Bracken scores, and the subscale of active stimulation was positively related to their scores on the time subscale of the Bracken and to their performance on the Coding task. The ratings of emotional climate were negatively related to CB children's Bracken scores.

Relation between quality of the home environment and older children's problem-solving strategies. There were no consistent relationships between the total HOME scores and RO or CB children's use of problem-solving strategies or their task-oriented behavior (Table 43). Correlations between HOME subscales and older RO and CB children's problem-solving strategies are found in Appendix X and Y, respectively. There was no consistent pattern of correlations between the HOME subscales and either group's strategies.

Summary of the relation between the quality of the home environment and older children's cognitive performance and strategy use. As hypothesized, quality of the home environment was positively related to how well older children performed on the cognitive measures, but only among the RO children. There did not seem to be any relationship between how stimulating the home environment was for CB children and their performance levels. The quality of the home environment did not seem to be consistently related to either RO or CB children's use of problem-solving strategies.

Table 43

Correlations between Total HOME Scores and Problem-solving Strategies in Older Children

	RO		CB	
	n	HOME	n	HOME
Task orientation	12	.34	11	-.07
Problem-solving strategies				
Impulsive responding	9	-.22		
Trial and error	6	.41	8	-.10
Visual scanning	6	.71	8	.06
Helpseeking questioning	6	.09		
Task talk	6	.18		

Relation between parental sensitivity and cognitive performance in 54-month-old children. The last and most proximal way of addressing family influence on children's development examined the influence of the parent-child relationship. The first aspects were ratings of parental sensitivity, as measured with parental warmth during the teaching task, and the quality of the relationship in the teaching task and the free-play sessions. As seen in Table 44, there were no relationships between any of these variables and any of the cognitive scores in the RO and CB samples. EA children's Stanford-Binet IQs were positively related to ratings of quality of the relationship in both the teaching task and the free-play sessions, and EA children's verbal IQs were positively related to ratings of parental warmth.

Relation between parental sensitivity and problem-solving strategies in 54-month-old children. Next, the relationship between parental sensitivity and children's problem-solving strategies was examined. Some correlations were found between ratings of quality of the relationship and children's strategies in all three groups (Table 45). Ratings of the quality of the relationship were negatively related to impulsive responding in the RO sample during both teaching (TOH) and free-play sessions, and in the CB sample only in the free-play session. Ratings of the quality of the relationship were positively related to task orientation in the CB and EA samples, although in the CB sample this was true only for the teaching task session. Ratings of parental warmth were not related to children's problem-solving strategies in any of the groups.

Relation between parental sensitivity and cognitive performance in the older children. Parental sensitivity seems to have played a larger role in the older RO children's cognitive performance (Table 46) than it had with the younger children (Table 44). Higher ratings of

Table 44

Correlations between Parental Sensitivity Variables from the Interaction Sessions and 54-month-old Children's Cognitive Scores

	RO			CB			EA		
	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT
Stanford-Binet IQ	.01	-.01	.06	-.06	.28	-.02	.32	.65**	.57**
Verbal comprehension	-.06	-.03	.13	.16	.17	.19	.40*	.55**	.47*
Nonverbal reasoning	.12	.04	-.06	-.17	.29	-.16	.19	.54**	.48*
Bracken School Readiness	-.06	.01	.23	-.17	.11	.10	-.23	-.00	-.12
Time subscale	.18	.33	.25	-.24	.33	-.21	-.08	.19	.40
Position subscale	-.01	.07	.24	-.20	.23	-.05	.08	.17	.42
Animal House performance	.09	.13	.12	-.14	.14	.35	-.08	-.16	-.11

* $p < .05$.

** $p < .01$.

Note: TWARM=warmth during teaching task; TQUALIT=quality of relationship during teaching task; FQUALIT=quality of relationship during free play.

Table 45

Correlations between Parental Sensitivity Variables from the Interaction Sessions and 54-month-old Children's Problem-solving Strategies

	RO			CB			EA		
	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT
Task orientation	.16	.27	.30	-.14	.37*	.25	.18	.40*	.48*
Impulsive responding	-.13	-.35*	-.39*	.01	-.26	-.44*	.04	-.03	-.28
Helpless confirmation	.15	.01	.25	.19	-.27	-.19	.00	-.13	-.33

* $p < .05$.

** $p < .01$.

Note: TWARM=warmth during teaching task; TQUALIT=quality of relationship during teaching task; FQUALIT=quality of relationship during free play;

Table 46

Correlations between Parental Sensitivity Variables from the Interaction Sessions and Older Children's Cognitive Scores

	RO			CB		
	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT
Stanford-Binet IQ	.49	.72**	.63*	.05	-.08	-.35
Verbal comprehension	.52	.66*	.41	.39	.08	-.13
Nonverbal reasoning	.46	.69*	.71*	-.14	-.11	-.25
Bracken School Readiness	.12	.27	.42	.34	.43	-.03
Time subscale	.30	.46	.31	.09	.17	-.30
Position subscale	.20	.40	.29	.20	.47	.04
Coding performance	-.16	.15	.03	.45	.66*	.16
Picture Arrangement performance	.08	.16	.21	.17	.58	.73
Raven's Matrices performance	-.24	-.06	-.33	.43	.07	-.32

* $p < .05$.

** $p < .01$.

Note: TWARM=warmth during teaching task; TQUALIT=quality of relationship during teaching task; FQUALIT=quality of relationship during free play;

quality of the relationship were associated with higher Stanford-Binet scores. These relationships were not found in the older CB group, however, indicating that CB children's performance on the Stanford-Binet was not related to contemporaneous ratings of their parent's sensitivity toward them.

Relation between parental sensitivity and problem-solving strategies in older children. RO children's use of problem-solving strategies was also related to ratings of parental warmth and quality of the relationship (Table 47). RO children who were less impulsive in their responding had parents who showed more warmth toward them in the teaching task, and children who used helpseeking questioning more often were part of dyads with higher ratings on quality of the relationship in both the teaching task and the free-play sessions. There were no significant relationships between parental sensitivity variables and CB children's problem-solving strategies.

Summary of the relationship between parental sensitivity and children's cognitive performance and use of problem-solving strategies. As hypothesized, ratings of parental sensitivity were positively related to children's cognitive scores. Ratings of parentalsensitivity were also related to more task orientation, less impulsivity, and more helpseeking questioning. These results, however, were not found in all of the groups. Ratings of the quality of the relationship were positively related to cognitive performance only in the older RO sample. Impulsive responding was negatively related to ratings of the quality of the relationship in the younger RO children and to ratings of warmth in the older RO children, while helpseeking questioning was positively related to quality of the relationship in the older RO children. Quality of the relationship was also related somewhat

Table 47

Correlations between Parental Sensitivity Variables from the Interaction Sessions and Older Children's Problem-solving Strategies

	RO			CB		
	TWARM	TQUALIT	FQUALIT	TWARM	TQUALIT	FQUALIT
Task orientation	-.16	.49	.55	-.35	.27	.07
Impulsive responding	-.78*	-.29	-.14			
Trial and error	-.29	-.07	-.31	.24	.13	-.30
Helpseeking questioning	.49	.85*	.94**			
Visual Scanning	-.04	.29	.04	.46	.57	.04
Task talk	-.03	.41	-.12			

* $p < .05$.

** $p < .01$.

Note: TWARM=warmth during teaching task; TQUALIT=quality of relationship during teaching task; FQUALIT=quality of relationship during free play;

to problem-solving skills in the CB sample, but only in the younger group. The most consistent relationships were found within the EA sample, with quality of the relationship related to higher Stanford-Binet scores and more task-oriented behavior.

Relation between parental control and 54-month-old children's cognitive performance. The second aspect of the parent-child relationship examined was parental control. Three ratings of parental control were assessed in this study: intrusiveness during both interaction sessions, controlling behavior versus encouragement of initiative during the teaching task, and teaching ability or directiveness, which included supportive presence, quality of instruction, and confidence during the teaching task. As seen in Table 48, none of these were related in any consistent way to RO children's cognitive scores. As well, few relationships between parental control and EA children's cognitive scores were found. This indicates that adopted children's cognitive performance was not related to the controlling or directive nature of their parent's interactions. Ratings of intrusiveness during the teaching task were consistently negatively related to CB children's cognitive scores, however, and these relationships were significantly different from relationships in the RO sample. Significant differences between CB and RO children's correlations between intrusiveness and total IQ (Pearson Filon $z = 2.39$, $p < .01$), between intrusiveness and School Readiness Composite ($z = 1.96$, $p < .03$), and between intrusiveness and Animal House ($z = 1.29$, $p < .05$) indicated that, in contrast to the lack of correlation in the RO group, CB parents who were relatively more intrusive in the teaching task had children who were performing less well on the Stanford-Binet, the Bracken, and the Animal House tasks.

Table 48

Correlations between Parental Control Variables from the Interaction Sessions and 54-month-old Children's Cognitive Scores

	RO				CB				EA			
	TINTRU	FINTRU	TENCOU	TEACHING	TINTRU	FINTRU	TENCOU	TEACHING	TINTRU	FINTRU	TENCOU	TEACHING
Stanford-Binet IQ	.21	-.04	.17	-.07	-.42*	-.10	.08	.03	-.14	.05	.40	.39
Verbal comprehension	.06	-.10	.18	-.08	-.27	-.29	.04	.11	-.10	.03	.21	.36
Nonverbal reasoning	.31	-.01	.18	-.01	-.37*	.05	.11	.02	-.40	-.13	.34	.33
Bracken School Readiness	.18	-.08	.22	.01	-.43*	-.34	.16	.07	-.02	.41	.03	.01
Time subscale	.04	-.02	.17	.34	-.16	.17	.28	.25	-.35	-.21	.13	.27
Position subscale	.31	-.05	.40	.03	-.29	-.08	.19	.20	-.06	-.14	-.10	.16
Animal House	-.13	-.13	.25	-.04	-.47**	-.21	.15	.14	-.17	.10	.13	.04

* $p < .05$.

** $p < .01$.

Note: TINTRU=intrusiveness during teaching task; FINTRU=intrusiveness during free play; TENCOU=encouragement of intitiative during teaching task; TEACHING=teaching during teaching task.

Relation between parental control and 54-month-old children's problem-solving strategies. Parental control was not significantly related to RO and EA children's use of problem-solving strategies (Table 49). Impulsive behavior and use of helpless confirmation seeking in the CB children, however, were significantly positively related to intrusiveness in both interaction sessions. Impulsive responding was also positively related to controlling parental behavior, and negatively related to effective teaching abilities within the CB group. This indicates that parents of CB children who were not intrusive in their interactions with their children, who were encouraging rather than controlling, and who showed good teaching skills, had children who were better problem-solvers. Parental control was unrelated to the adopted children's problem-solving abilities, regardless of their orphanage experience.

Relation between parental control and older children's cognitive performance. For the RO sample (Table 50), although parents were not very intrusive, intrusiveness was positively related to all cognitive scores, and significantly related to children's Bracken Time and Position subscales and their performance on Raven's Matrices. Better parental teaching ability was related to higher Stanford-Binet IQs. For the CB sample (Table 50), however, different relationships were found: Parental intrusiveness was generally related to lower cognitive scores; parental encouragement of initiative was related to higher cognitive scores, except on Picture Arrangement; and no relationship was found between parental teaching ability and children's cognitive performance.

Relation between parental control and older children's problem-solving strategies. The pattern of correlations between parental control and older RO and CB children's problem-solving strategies was different (Table 51) from that found for younger children;

Table 49

Correlations between Parental Control Variables from the Interaction Sessions and 54-month-old Children's Problem-solving Strategies

	RO				CB				EA			
	TINTRU	FINTRU	TENCOU	TEACHING	TINTRU	FINTRU	TENCOU	TEACHING	TINTRU	FINTRU	TENCOU	TEACHING
Task orientation	.04	-.11	.44	.13	-.32	-.16	.34	.38*	-.07	.15	.12	.20
Impulsive responding	.25	.22	-.16	-.09	.61**	.76**	-.45*	-.45*	-.05	.04	.13	-.20
Helpless confirmation	.06	-.02	.18	-.07	.58**	.46*	-.13	-.30	.09	.26	-.24	-.15

* $p < .05$.

** $p < .01$.

Note: TINTRU=intrusiveness during teaching task; FINTRU=intrusiveness during free play; TENCOU=encouragement of intitiative during teaching task; TEACHING=teaching during teaching task.

Table 50

Correlations between Parental Control Variables from the Interaction Sessions and Older Children's Cognitive Scores

	RO					CB				
	n	TINTRU	FINTRU	TENCOU	TEACHING	n	TINTRU	FINTRU	TENCOU	TEACHING
Stanford-Binet IQ	12	.14	-.24	.38	.63*	11	-.45	-.69*	.60*	-.09
Verbal comprehension	12	.24	-.08	.30	.63*	11	.08	-.37	.12	.10
Nonverbal reasoning	12	.05	-.35	.43	.58*	11	-.52	-.67*	.61*	-.13
Bracken School Readiness	9	.53	.18	-.34	.10	11	-.56	-.62*	.73*	.40
Time subscale	8	.82*	.45	-.43	.47	11	-.74*	-.62*	.79**	.13
Position subscale	8	.75*	.38	-.49	.32	11	-.68*	-.43	.76**	.40
Coding performance	10	.28	.32	-.07	-.27	9	-.67*	-.18	.65	.53
Picture Arrangement performance	9	.22	.16	-.13	-.08	7	.50	.57	-.54	.55
Raven's Matrices performance	9	.80*	.56	-.70*	.16	9	-.24	-.39	.14	-.06

* $p < .05$.

** $p < .01$.

Note: TINTRU=intrusiveness during teaching task; FINTRU=intrusiveness during free play; TENCOU=encouragement of intitiative during teaching task; TEACHING=teaching during teaching task.

Table 51

Correlations between Parental Control Variables from the Interaction Sessions and Older Children's Problem-solving Strategies

	RO					CB				
	n	TINTRU	FINTRU	TENCOU	TEACHING	n	TINTRU	FINTRU	TENCOU	TEACHING
Task orientation	12	-.21	-.34	.44	-.01	11	-.72*	-.22	.60*	.21
Impulsive responding	9	.03	-.09	-.18	-.41					
Trial and error	6	.67	.68	-.77	-.30	8	-.43	.31	-.08	-.12
Helpseeking questioning	6	-.02	-.61	.50	.52					
Visual Scanning	6	.93*	.63	-.69	.12	8	-.47	.43	.08	.36
Task talk	6	.20	.19	-.32	.12					

* $p < .05$.

Note: TINTRU=intrusiveness during teaching task; FINTRU=intrusiveness during free play; TENCOU=encouragement of intitiative during teaching task; TEACHING=teaching during teaching task.

however, few correlations reached significance. Parental intrusiveness was negatively related to CB children's task oriented behavior whereas it was positively related to RO children's use of visual scanning. Parental teaching ability was not related to children's use of strategies in either group.

Summary of the relationship between parental control and teaching ability and children's cognitive performance and use of problem-solving strategies. As hypothesized, use of parental control was differentially related to children's cognitive scores depending on group membership. Parental control, rated as intrusiveness and/or low encouragement of initiative, was related to lower cognitive scores in the whole CB sample, to more impulsive responding and helpless confirmation seeking in the 54-month-old CB group, and to less task oriented behavior in the older CB group. Within the RO sample, however, parental control was related to higher Bracken and Raven's Matrices scores, and more visual scanning in the older group, whereas no significant relationships were found between control and performance or strategies in the 54-month-old group. There were also no significant relationships found within the EA sample. Parental teaching ability was positively related to children's cognitive performance, but only in the older RO group.

Relationships Between Current Child Behavior and Children's Cognitive Performance

Relation between 54-month-old RO children's behavior and their cognitive performance. Table 52 displays correlations between current child behavior variables from the assessment and parent-child interaction sessions and cognitive scores in the RO sample. Children who were more task oriented had higher scores on the Stanford-Binet, Bracken, and Animal House task. Children's use of impulsive responding was negatively related to all

Table 52

Correlations between 54-month-old RO Children's Behavior and their Cognitive Scores

	Task orientation	Impulsive responding	Helpless confirmation Seeking	Enthusiasm	Engagement
Stanford-Binet IQ	.58**	-.39*	-.21	.15	.11
Verbal comprehension	.51**	-.30*	-.07	.18	.12
Nonverbal reasoning	.53**	-.39*	-.38*	.05	.11
Bracken School Readiness	.65**	-.26	-.05	.23	.18
Time subscale	.56*	-.35	-.33	.25	.18
Position subscale	.63**	-.25	-.14	.26	.27
Animal House performance	.50**	-.55**	-.19	.10	.11

* $p < .05$.

** $p < .01$.

cognitive measures except Bracken subscales. Children with lower nonverbal IQs used helpless confirmation seeking more often. Ratings of children's enthusiasm during the free-play session and engagement during the teaching task were not related to their cognitive scores.

Relation between 54-month-old CB children's behavior and their cognitive performance. Consistent with RO children, CB children's (Table 53) task orientation was related to higher cognitive scores. CB children's impulsive responding was also related to poorer scores, but significantly only on the School Readiness Composite and on the Animal House task. There were also significant negative relationships between frequency of helpless confirmation seeking and cognitive scores. As with the RO sample, no relations were found between enthusiasm and engagement during the interaction tasks and CB children's cognitive scores.

Relation between 54-month-old EA children's behavior and their cognitive performance. For children in the EA group, the pattern of correlations for task orientation was consistent with the other two groups, that is, children who were more task-oriented performed better on the Stanford-Binet and the Bracken (Table 54). Impulsive responding and helpless confirmation seeking, however, were not strongly related to EA children's cognitive scores. EA children's enthusiasm during the free-play session and to some extent their ratings of engagement during the teaching task were positively related to their Stanford-Binet IQs.

Table 53

Correlations between 54-month-old CB Children's Behavior and their Cognitive Scores

	Task orientation	Impulsive responding	Helpless confirmation Seeking	Enthusiasm	Engagement
Stanford-Binet IQ	.44*	-.30	-.37*	-.16	.03
Verbal comprehension	.33	-.22	-.14	-.08	.16
Nonverbal reasoning	.36*	-.21	-.39*	-.18	.00
Bracken School Readiness	.23	-.47*	-.51**	-.02	-.03
Time subscale	.42*	-.08	-.18	-.28	.25
Position subscale	.23	-.26	-.27	-.11	-.03
Animal House performance	.21	-.59**	-.59**	.14	.02

* $p < .05$.

** $p < .01$.

Table 54

Correlations between 54-month-old EA Children's Behavior and their Cognitive Scores

	Task orientation	Impulsive responding	Helpless confirmation Seeking	Enthusiasm	Engagement
Stanford-Binet IQ	.70**	-.19	-.36	.61**	.46*
Verbal comprehension	.66**	-.37	-.31	.42*	.34
Nonverbal reasoning	.57**	-.07	-.33	.54**	.29
Bracken School Readiness	.40	-.04	-.21	-.03	.03
Time subscale	.59**	-.60**	-.35	.42	.12
Position subscale	.67**	-.43	-.38	.35	.04
Animal House performance	.18	-.06	-.06	-.00	-.31

* $p < .05$.

** $p < .01$.

Summary of the relations between 54-month-old children's behavior and their cognitive performance. The task-oriented behavior of children in all groups was significantly related to their cognitive scores. Impulsive responding was negatively related to RO and CB children's scores, but not to EA children's scores. For the CB children, helpless confirmation seeking was negatively related to their cognitive scores while the relationships, although consistently negative in direction, did not reach significance in the adopted groups. EA children who appeared more enthusiastic during the free-play session and engaged with their parent during the teaching task performed better on the Stanford Binet than children who were not rated as high. Ratings of enthusiasm during the free-play session and engagement during the teaching task were not significantly related to children's cognitive scores in either the RO or the CB samples.

Relation between older RO children's behavior and their cognitive performance. RO children's task oriented behavior was not significantly related to their Stanford-Binet IQs (Table 55). The effective use of helpseeking questioning was positively related to RO children's performance on the Stanford-Binet and their use of visual scanning was positively related to their performance on two of the problem-solving tasks. RO children's enthusiasm during the free-play session and their engagement during the teaching task were not related to their performance on the cognitive measures.

Relation between older CB children's behavior and their cognitive performance. CB children's task oriented behavior was positively related to their Stanford-Binet and Bracken

Table 55

Correlations Between Older RO Children's Behavior and their Cognitive Scores

	Task Orientation	Impulsive responding	Trial & error	Helpseeking questioning	Visual scanning	Task talk	Enthusiasm	Engagement
Stanford-Binet IQ	.56	-.34	-.01	.86*	.46	.07	.36	.30
Verbal comprehension	.44	-.38	.18	.64	.56	.20	.21	.31
Nonverbal reasoning	.56	-.26	-.06	.90*	.44	.00	.47	.27
Bracken School Readiness	.23	-.16	.48	.76	.77	.22	-.11	-.07
Time subscale	.11	-.12	.71	.56	.89*	.17	-.21	.03
Position subscale	.09	-.11	.56	.66	.79	.28	-.30	-.05
Coding performance	.44	.13	.71	.43	.93*	.40	.16	.43
Picture Arrangement performance	.40	-.06	.42	.68	.83*	.20	.06	.17
Raven's Matrices performance	-.39	.53	.54	-.40	.68	.07	-.26	-.09

* $p < .05$.

scores (Table 56). Problem-solving strategies were not consistently related to children's cognitive scores, while CB children's engagement during the teaching task was positively related to their performance on the Bracken and one of the problem-solving tasks.

Summary of the relations between current child variables and older children's cognitive performance. Task orientation was positively related to older CB children's cognitive performance, whereas there was no significant relationship in the older RO sample. Although no older CB child used helpseeking questioning, older RO children who used helpseeking questioning more often were higher functioning children. Older RO children who visually scanned during the problem-solving tasks performed better.

Table 56

Correlations Between Older CB Children's Behavior and their Cognitive Scores

	Task Orientation	Trial & error	Visual scanning	Enthusiasm	Engagement
Stanford-Binet IQ	.66*	.00	-.14	-.30	.23
Verbal comprehension	.19	-.07	.08	-.19	.06
Nonverbal reasoning	.63*	.02	-.27	-.18	.26
Bracken School Readiness	.53	.48	.44	-.01	.64*
Time subscale	.63*	.38	.16	-.20	.49
Position subscale	.78**	.51	.60	.08	.64*
Coding performance	.72*	.59	.81*	.04	.76*
Picture Arrangement performance	-.10	.47	.67	.71+	.42
Raven's Matrices performance	.40	.84**	.66	-.33	.16

* $p < .05$.

** $p < .01$.

Discussion

The purpose of the present study was to investigate the long-term effects of institutionalization on a group of undernourished and understimulated children adopted from Romanian orphanages. This study, which examined children's progress approximately three years post-adoption, was a follow-up to the first phase which was undertaken when the children had only spent approximately one year with their adoptive families (Morison et al., 1995). Although the present study is an "experiment in nature", complete with limitations and potential problems, it does attempt to answer some important questions that have yet to be examined empirically in the literature. Given that international adoption is on the rise, it is important to address such questions as: Does children's cognitive development continue to improve with time in stimulating adoptive homes? What are the long-term effects of institutional experience on cognitive development and how do children's problem-solving skills (or lack thereof) influence their performance? How does the adoptive family environment influence children's development?

Consistent with previous results on the effects of institutionalization on children's cognitive development post-adoption (Dennis, 1973; Flint, 1978; Goldfarb, 1943, 1945, 1955; Groze & Ileana, 1995; Provence & Lipton, 1962), Romanian Orphanage (RO) children in this study performed at lower levels on all cognitive measures than Canadian-Born (CB) comparison children. Children with poor pre- and perinatal care and early institutional experience therefore continued to display deficiencies in development even after spending three years in stimulating family environments. The 54-month-old Orphanage children, who had been adopted before two years of age, however, attained average range Stanford-Binet

IQs, verbal comprehension scores, and Bracken Basic Concept scores, indicating resilience in overcoming early deficits.

Comparison between the Orphanage group and the Early Adopted (EA) group was not as straightforward. Although Orphanage children performed at lower levels than Early Adopted children on most cognitive measures, the groups did not differ significantly on nonverbal reasoning and two of the subscales of the Bracken, even though differences appeared large. As well, the Early Adopted group's performance was consistently somewhere between that of the Orphanage group and the Canadian-Born group. These results indicate that although institutional experience negatively influences children's cognitive performance after adoption, pre- and perinatal backgrounds and environments also have an influence on children's performance. As institutionalization in Romania took place for various reasons, including poverty, family dysfunction, physical and mental disability, and abandonment (Johnson, Edwards, & Puwak, 1993), Early Adopted children may be considered potentially "at risk" because of their backgrounds even though they did not experience extensive institutional deprivation.

The findings of Goldfarb (1943, 1945) and Provence and Lipton (1962) indicated that orphanage-reared children had particular difficulty with concept formation, language, and understanding concepts of time and space. The present study did not fully support their contentions; there were no distinguishing strengths or weaknesses in the particular areas assessed in the Stanford-Binet and the Bracken subscales. The Early Adopted group also consistently performed more poorly than the Canadian-Born group, albeit better than the Orphanage group, which leads one to conclude that pre- and perinatal

background/environment are related to an overall dampening effect, in addition to the dampening effect of orphanage experience. The inconsistency of these results with extant research may be due to several reasons. One, more systematic assessment of two adopted samples was made in this study, enabling one to distinguish relations with orphanage experience from relations with prenatal background. Two, Goldfarb's (1943, 1945) studies were performed with adolescents when assessment of these abstract areas may be more appropriate. Goldfarb (1945) discussed how the children had limited foresight, and difficulty grasping or anticipating the future, abstract concepts of time which are perhaps not captured or assessed on the more concrete Bracken Time/sequence subscale. As well, Provence and Lipton's (1962) mention of post-institutionalized children's excessive concreteness of thought and difficulty verbalizing feelings may also not have been assessed on the particular subscales of the Stanford-Binet which are appropriate for children between the ages of four and nine, as in this study.

According to some researchers who examined orphanage-reared children post-adoption (Flint, 1978; Goldfarb, 1945), children with orphanage experience displayed deficiencies in effective problem-solving as evidenced by being easily frustrated by difficult tasks, not turning to adults for help, and being distractible. These findings were replicated in the present study. Orphanage children were less task-oriented, more impulsive in their responding, and used helpless confirmation seeking more frequently than Canadian-Born children. Although the Early Adopted children were just as impulsive as the Orphanage group, they were not significantly different from the Canadian-Born group on impulsivity. Early Adopted children were also comparable to Canadian-Born children on task orientation

and helpless confirmation seeking, indicating that institutional experience did seem to influence problem-solving abilities and task oriented behavior over and above the effects of pre- and perinatal background.

Impulsivity, task orientation, and effective strategic behavior were all related to Orphanage children's developmental status. This is consistent with findings in normal samples where inhibition of impulsive behavior and sustained attention (Levy, 1980; Paulsen & Johnson, 1980) and efficacy of strategic problem-solving behavior (Kontos, 1983; Kontos & Nicholas, 1986) were related to age and practice, and thus by inference to developmental status. Because of early delays and unstimulating backgrounds, Orphanage children were behind other children their age in development of task orientation and problem-solving strategy use. Thus, not only should orphanage-reared children be taught specific information in order to help them catch up to their peers, but they should also be given remedial aid in how to learn new tasks, how to focus their attention toward completion of a goal, and how to enjoy the challenge of a difficult task.

During the first phase of this study, at 11 months post-adoption (Morison et al., 1995), institutional variables played a large role in determining which Orphanage children were developing better than other children. Two years later or approximately three years post-adoption, most institutional variables no longer influenced the development of the children. Favoritism, availability of toys, and cleanliness of the children in the orphanage were not related to current cognitive performance. Only time in institution still played a role in how well children were doing post-adoption: the longer children had been in orphanage, the worse they were doing post-adoption. This is consistent with past research (Dennis,

1973; Flint 1978), as well as with the first phase results from this study (Morison et al., 1995). Continuity of cognitive functioning was also observed, as first phase developmental status of the children was positively associated with how well they were doing at Time 2.

Although at Time 1 family variables were not related to children's progress post-adoption, possibly due to the overriding influence of the institution (Morison et al., 1995), several family variables played significant roles in children's progress once they had lived in Canada for more extensive periods of time. First, socioeconomic status was positively related to Orphanage children's cognitive performance. There are two potential explanations for this. One, higher status families picked children who were doing better to begin with (an hypothesis that could not be investigated with our measures because at the time of adoption almost all children were delayed in almost all areas). Two, compared to lower status families who may have found it difficult dealing with encountered problems and thus have had less time and energy to stimulate their adopted child appropriately, the greater resources of the higher status families may allow them to deal with problems which may surround adoption of an orphanage-reared child and to focus on appropriate stimulation for the child. Socioeconomic status in the present study was based on the education and income associated with particular occupations, and to a minor extent on occupational prestige. Having the knowledge, experience, and contacts to gain access to needed information or services, or having a bit of extra income to pay for a good preschool or an occasional babysitter to alleviate some of the stress associated with raising a child who needs extra care may make all the difference.

Second, frequency of impulsive responding in Orphanage children was significantly negatively related to level of maternal education and total HOME scores. The same results were also found in the two comparison samples, and are consistent with research by Palfrey, Levine, Walker, and Sullivan (1985), which found that low maternal education (completion of high school or less) was related to persistent concerns of attention problems in children. Brazelton, Koslowski, and Main (1974) have postulated that caregivers initially regulate their infant's arousal by being aware of and sensitive to the infant's capacity to receive and use stimulation. In response to their infant's cues, caregivers provide stimulation when the infant is underaroused and reduce it when the infant is overexcited. With development, the child increasingly takes over more control of pacing him/herself, internalizing the regulation process. If parents adopting an orphanage-reared child with minimal stimulation experience are unaware of how overstimulating their child's new environment is, and thus do not provide the child with a gradual introduction to stimulation and training in how to deal with and moderate it, then the child may have difficulty learning how to focus attention and inhibit motor movements, thus displaying impulsivity and distractibility. Although level of maternal education and HOME scores are crude measures, they may be indications of awareness of the developmental needs of children.

Although the three groups of families had been matched to each other in terms of income, socioeconomic status, and most parent characteristics, according to the HOME inventory there were differences in the amount of stimulation and support provided for children. The families of Orphanage children, both 54-month-olds and older children, had lower total HOME scores than did the families of Canadian-Born children, while Early

Adopted children's families scored in the middle. These differing levels of stimulation were not anticipated, and have not been discussed by others examining the development of previously institutionalized children. Instead, researchers seem to have assumed that adoption into the more stimulating environment of relatively high status families would be sufficient for cognitive growth (Clarke & Hanisee, 1982; Dennis, 1973; Winick et al., 1975). One explanation for these group differences stems perhaps from the fact that others working on this study found that, according to parent interview, Orphanage children displayed more eating, medical and stereotyped behavior problems (Fisher, Ames, Chisholm, & Savoie, 1994) and were less securely attached and more indiscriminately friendly (Chisholm, 1996; Chisholm, Carter, Ames, & Morison, 1995) than the comparison groups. Parents who adopted Orphanage children, therefore, have had a great deal to handle since the adoption, and may have fewer resources or less time to stimulate their child appropriately.

Orphanage and Early Adopted children whose parents had provided them with a generally stimulating environment were doing better on IQ tests, whereas there was little relationship between Canadian-Born children's performance on the cognitive measures and their HOME scores. The results for the adopted Romanian children are thus consistent with findings in the literature of a positive relationship between children's cognitive performance and their concurrent HOME scores (e.g., Bradley et al., 1986; Bradley et al., 1989; Gottfried, 1984), while the results for the Canadian-Born children are not. Perhaps this group discrepancy is due to the fact that Canadian-Born children's families had higher HOME scores than did Orphanage children's families, and that all or nearly all Canadian-Born children's families provided at least adequate stimulation for the current needs of their

children. Orphanage and Early Adopted children, due to their backgrounds, however, may require more than minimal levels of stimulation in order to prosper in their development.

A recent study by Hart and Risley (1995) provides some basis for estimating the amount of remedial stimulation Orphanage children might need. They estimated that by the age of 3, children in professional families hear more than 30 million words, children in working class families hear 20 million, and children in welfare families hear 10 million. They also found that the number of different words the parent said and the number of sentences the child heard containing past-tense verbs or questions were positively related to the child's vocabulary growth and Stanford-Binet IQ, whereas the number of initiations, orders, and prohibitions the parent gave the child was negatively related to the child's vocabulary use and IQ. Given these findings, it is not surprising that children reared in orphanage for the first part of their lives and then hearing and learning a new language would have a tremendous amount to catch up compared to children reared from the beginning in low status families, not to mention compared to children in relatively high status families.

Another possibility for explaining the stronger correlations between performance and HOME scores in the two adopted groups compared to the Canadian-Born group reflects a transactional approach (Cicchetti et al., 1988). Given the HOME subscales upon which the Orphanage and Canadian-Born children differed, namely language and academic stimulation, and acceptance of the child for the 54-month-olds, and provision of active stimulation, family participation in developmentally stimulating experiences, paternal involvement, physical environment, and provision of growth-fostering experiences for the older children, and given the fact that Orphanage children were delayed in their development at Time 1 (Morison et al.,

1995), a positive feedback loop may be in place (Siegel & Cunningham, 1984). Orphanage children with delayed development (and potentially other problems as well) may be less responsive to stimulation and may provide insufficient cues to families for appropriate stimulation, which leads to inadequate stimulation on the part of the parents. In response, the child becomes more delayed, and it becomes harder to read his or her cues. Alternatively, parents who provide stimulation and support for the child regardless of initial delay, may be able to push the child to a more mature level cognitively. The child is then more able to provide appropriate cues, and the parent responds with more stimulation.

Ratings of parental sensitivity were positively related to Stanford-Binet scores, but only in 54-month-old Early Adopted children and in older Orphanage children. These relationships are consistent with research indicating a positive influence of warmth and sensitivity on a child's cognitive abilities (Crowell & Feldman, 1988; Estrada et al., 1987; Jennings & Connors, 1989). Perhaps the nonsignificant findings in the Canadian-Born group and the younger Orphanage group may be due to parents masking their feelings and reactions for the videocamera (or not being as concerned about their child's performance on the teaching task because they knew it was a difficult task for a child that age). In contrast, families who had adopted children early may have been unable to mask their feelings of accomplishments or, for parents who had adopted older children, their feelings of shortcomings.

With regard to the relationship between parental sensitivity and children's problem-solving strategies, two interesting results were found. The first is that parents who were less sensitive with their children had more impulsive children or children who were less task-

oriented. Perhaps this is a sign of frustration on the part of the parent when attempting to teach their child a task, a task which they feel the child should understand but is not understanding because of distractibility and developmental delay. Mash and Johnston (1982) found that mothers of hyperactive children were generally more negative during play and less responsive to child-initiated interactions than mothers of non-hyperactive children, and during structured-task situations, mothers of hyperactive children were more negative and less interactive and approving of their children, even when their child was interacting appropriately.

The second interesting result is the positive relationship between frequency of helpseeking questioning and quality of the parent-child relationship in older Orphanage children. It seems that the higher the quality of the relationship or the more reciprocal and flexible the relationship is, the more likely the child is to ask for help when problem-solving becomes too difficult. Goldfarb (1943) and Flint (1978) found that children reared in institutions were less likely to ask for help in solving problems. The finding in the present study indicates, however, that the use of this strategy varies depending on the quality of the parent-child relationship. Children in all other groups (young RO, EA, and all CB children) did not use this strategy when attempting to solve the tasks. Older Orphanage children whose parents are warm and sensitive appear to have learned that they can rely on them for help when they find a situation too difficult to deal with on their own.

Assessment of parental control proved to be quite fruitful in this study. First, consistent with research indicating that mothers of children with distractibility and low attention issue more commands during free-play and teaching situations (Cunningham &

Barkley, 1979; Mash & Johnston, 1982), and that mothers of developmentally delayed children spend more time attempting to manage and control their children's behavior than do mothers of non-delayed children (Breiner & Forhand, 1982; Cielinski et al., 1995; Terdal et al., 1976), mothers of older Orphanage children were more controlling during both free-play and teaching task sessions than mothers of older Canadian-Born children. It is important to note however, that the intrusiveness of the mothers of Orphanage children was subtle and not pervasive, and did not seem to bother the child. Parents of Canadian-Born children were much less likely to display any intrusive behavior.

Second, consistent with research on the negative effects of intrusive and controlling behavior on children's development (Crowell & Feldman, 1988; Egeland, 1985; Egeland et al., 1993; Roberts, 1983), Canadian-Born children whose parents were more intrusive and less encouraging of initiative were doing more poorly on cognitive tests than children whose parents were less controlling. This finding is also probably related to the fact that some of the parents of Canadian-Born children were feeling the need to control their children, as intrusiveness was also positively related to ratings of impulsive behavior in the younger children and negatively related to task orientation in the older children.

For children with early deprivation experience, however, controlling behavior by parents was not negatively related to their cognitive performance or their impulsive behavior. In the case of older Orphanage children, parental control was even positively related to some cognitive scores. As well, better parental teaching ability was related to better performance within the older Orphanage group, indicating the strong need of these children for structure and facilitative directiveness. These findings are consistent with Flint's (1978) report of the

positive effects of her intervention programme, which emphasized controlling and structuring the environment and the interactions of orphanage-reared children. As the Orphanage children and the Early Adopted children did not differ on impulsive behavior and on some of the cognitive measures, and both were more impulsive and delayed than Canadian-Born children, it may be that their adoptive parents have learned that they need to control the situations their children are in, either for fear that the children may get out of hand or not know what to do on their own with unfamiliar toys and tasks. Their children may be accustomed to this control and do not see it as negative.

Caution should be exercised when interpreting the results of this study, as several methodological limitations were present in this "natural experiment". First and foremost is the fact that the Romanian groups were self-selected. Although the Orphanage and Early Adopted children did not differ on their birthweights or their general health when parents first met them in the orphanage/hospital (Morison et al., 1995), parents who adopted children early were better educated than parents who adopted children with orphanage experience, and they also had a preference for adopting children younger than those preferred by parents who adopted Orphanage children (Morison et al., 1995).

Another limitation of this study relates to two irremediable confounds in the data. The first is the singular relationship between the amount of time spent in institution and age at adoption for the Orphanage group. Because of this confound one cannot say whether the influence of the orphanage on children's development was due to the extent of institutional experience or to their age at the point when they left the unstimulating environment of the Romanian orphanage and were adopted into stable and stimulating North American homes.

As age is a marker for how normally developing children behave and what they are able to accomplish, parents' expectations may be influencing the development or progress of their adoptive child. For example, a parent adopting a two-year-old girl may expect that she be able to focus her attention on particular objects or tasks for a certain amount of time and so may present her with a room full of dolls and toys, something that may be totally overwhelming for her. Because of her early deprivation, she will probably require a great deal of help in order to bring her attention span to the point that another two-year-old has reached.

The second confound is the 13-month discrepancy in amount of time in adoptive homes between the Orphanage and Early Adopted children. Not only had the children in the Orphanage sample been exposed to the orphanage for a longer period of time but they had also had less time in their more stimulating home environments. As we had decided to match the children on age at interview it was impossible to circumvent this difference. Lastly, it should be noted that as a high proportion of the Canadian-Born children in this sample performed at above-average levels on the Stanford-Binet, both the Orphanage and the Early Adopted children would have looked better if they had been compared to average Canadian children.

In summary, children with early orphanage experience have generally made great progress since their adoption to Canada; however, most have not yet caught up with children who have spent all their lives in a family. The majority of the 54-month-old Orphanage children scored in the average range for their age on all measures. The older Orphanage children, however, have had to come from further behind because of their longer time in

orphanage and a shorter time in Canada, and have lower IQs than the younger Orphanage children and than their Canadian-Born age matches. As the number of delays at Time 1 was related to later developmental status, children who display delays can be picked out as the ones who will require a great deal of help as early as a year post-adoption, and thus should be given the remedial aid they need.

Dennis (1973) concluded that two years in orphanage was the cut-off for eventually attaining normal intelligence post-adoption. Due to methodological limitations in his study, however, it does not seem that this hypothesis has been given an adequate test. Even after the present study questions remain. It seems that adoption before two years of age boded well for the 54-month-old children, as they had a number of years in their stimulating environments to prepare them adequately for school entry. Children adopted at older ages, however, not only had more delays to make up due to more extensive deprivation in the orphanage, but they also had less time to adjust and develop in their new homes before reaching school age. They were more likely to enter the school system behind schedule. Half of them are one to two years older than their classmates, and the other half probably require remedial aid. Unless the former group are given extra work, they are likely to remain with their classmates and continue to be behind other children their age. The aid required by the latter group, on the other hand, is likely to continue for some time. As such, it seems that the probability of either of these groups of older children catching up intellectually to other children their age is low.

Aside from performance level, Orphanage children also demonstrated less efficient problem-solving skills than Canadian-Born children in that they were more impulsive,

helpless instead of independent in attempting to solve problems, and less task-oriented. Perhaps these differences are a reflection of their delayed development; only time will tell. However, these results emphasize the need not only to teach these children specific facts, but also ways of approaching new learning situations. The importance of teaching these skills as early as possible is evident, given that ratings of attention span and restlessness affect test score gains in first grade (Alexander, Entwisle, & Dauber, 1993). As well, impulsive behavior and poor attentional control have been associated with disruptive behavior disorders (Barkley, Grodzinsky, & DuPaul, 1992).

Lastly, Orphanage children's performance and problem-solving strategies covaried with a number of family influences. The amount of stimulation and support provided for them, in terms of quality of the environment, warmth, control or structure, and teaching ability were all related to children's cognitive performance. Thus, early intervention, structure, appropriate stimulation and warmth, and enough resources to deal with other problems that may be encountered, all are necessary for helping these children overcome their early deprived beginnings.

As most of the children in this study had not attained school age at the time we studied them, and as those who had seemed to be have had some difficulty with the school environment, it would be very important to continue examining these children in the future. Particular questions that remain unanswered are: What other factors, such as family stress, and children's social development and attachment to their adoptive families influence the cognitive development of orphanage-reared children? Will children with orphanage experience continue to progress in their cognitive development and perhaps catch up to other

children who have lived in families all their lives? Will these children experience the specific deficits in abstract thinking that previous researchers found in the orphanage-reared adolescents they studied? Valuable lessons can be learned by studying these children, not only for their benefit, but also for educating prospective parents who want to adopt internationally, and for government policy on international adoption.

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Appendix A

A Brief Description of the Parent-child Interaction Rating Scales

Egeland's Teaching Task Rating Scales:

The *Supportive Presence* scale reflects the degree to which the parent expressed positive regard and emotional support to the child. At the high end of the scale, the parent continuously and skillfully provided emotional support to the child and consistently reinforced the child's successes. At the low end of the scale the parent completely failed to provide support for his/her child.

The *Parental Intrusiveness* scale captures the degree to which the parent intruded on the child's play or performance during the teaching task. This could be seen when the parent redirected the child in a poorly timed fashion or intervened before the child needed help. At the high end of this scale was a parent whose own agenda took precedence over the child's wishes and who failed to understand or to recognize his/her child's efforts to gain autonomy. At the low end of the scale there was no sign of intrusiveness.

The *Quality of Instruction* scale taps a parent's ability to structure the task such that his/her instructions were timely to the child's current focus, at a speed which allowed the child to comprehend the directives, graded in logical steps, and clearly stated. The highest score on this scale indicated a parent who sufficiently structured the task so that the child understood the objectives and could attempt to solve the problems directly. He/she did this in such a way that his/her assistance was flexible and was coordinated to the child's activity and needs for assistance. The low end of the scale was reflective of a parent who was completely uninvolved or who had no effective plan of teaching in that he/she failed to structure the task so that the child understood what was required of him/her.

Appendix A continues on next page

The *Parent's Confidence* scale measures the degree to which the parent seemed to believe that he/she could deal successfully with the child and that the child would behave appropriately in the situation. A high rating on the scale reflects a parent who was confident that his/her interactions with the child would proceed smoothly and seemed to have evaluated the relationship as being very good. A low rating on the scale is indicative of a parent who showed his/her low levels of confidence by being tentative or appeasing, power assertive or controlling, or by distracting the child from potentially difficult situations.

The *Child's Persistence* scale measures the extent to which the child was problem-oriented in the task regardless of the degree to which the parent was instrumental in creating this persistence. The high end of the scale indicates a child who was actively engaged in the task and who displayed few or no diversionary tactics to avoid the task. At the low end of the scale was a child who actively tried to avoid the task and who spent as little time as he or she could doing the task. He/she showed no effort on the task, refused to become involved in the task, and may have tried to flee from the situation.

The *Child's Enthusiasm* scale involves a child having had a sense of agency and having had a coordination of affect and behavior in such a way that reflected his or her vigor, confidence, and eagerness to do the task. A high rating on the scale was given to a child who approached the tasks eagerly and with a notable sense of energy and confidence. A child obtaining the highest rating would "jump" on the tasks with eagerness and would want to get involved. The low end of the scale reflected a child who demonstrated an extreme lack of confidence, who was affectively restrained, and who showed no interest or excitement in his or her performance.

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The *Child Compliance* scale measures the degree to which the child listened to and complied with his or her parent's suggestions. At the high end of this scale, a child matched his/her behavior in a detailed fashion to his/her parent's directions. The low end of the scale is indicative of a child who actively refused to comply with his or her parent's directives for substantial portions of the session.

The *Child's Experience of the Session* scale measures the degree to which the session reuslted in the child having feelings of success and competence on the task and in having a good relationship with his/her parent. A child with a high score on thsi scale worked well with his/her parent to successfully complete the task, while a child with a low score on this scale was rejected by his/her parent or had many conflicts with the parent such that the child felt incompetent on the task and in his/her relationship with his/her parent.

The *Child's Affection Toward/ Positive Orientation Toward Parent* scale measures the extent to which there was positive regard and the sharing of happy feelings of the child toward his/her parent. The high end of the scale reflects a child who was warm and expressive toward his/her parent for substantial portions of the session while a point low on the scale reflects a child who did not attempt to share experiences with the parent.

The *Quality of the Relationship* scale focuses on the affective and reciprocity apsects of the parent-child relationship. A high score gives evidence to a relationship in which there was a strong sense of relatedness and of mutual engagement between the parent and child. A low score on this scale reflects a parent-child dyad where the core sense of emotional relatedness was absent and where they did not interact responsively to each other.

Appendix A continues on next page

Marfo's Parent-child Interaction Scales

The *Parental Warmth* scale focuses on the affection the parent shows the child during the interaction. A high score reflects a parent who displays a great deal of affection toward the child throughout the interaction, touching, kissing, and praising the child. A low score on the scale reflects a parent who interacts with the child in a cold manner, showing little affection toward the child.

The *Parental Encouragement of Initiative* scale measures the extent to which the parent encourages the child to tackle the task(s) on his/her own, while at the same time giving help and guidance when appropriate. A high score reflects a parent who encourages the child to initiate as much as possible the problem-solving, while providing guidance in a noncontrolling way when appropriate. A low score on the scale represents a controlling parent who directs every step of the task, without letting the child initiate any moves on his/her own. A parent scoring at the midpoint of the scale uses either some controlling and some encouraging behavior, or is neither controlling of the situation nor encouraging the child to do the task on their own.

Appendix B

Brief Description of the Subscales of the Preschool Version of the Home Observation for Measurement of the Environment (HOME)

1. Toys and learning materials: This subscale contains 11 items which assess whether the home contains stimulation materials such as puzzles, record player, art materials, books, toys, and games which teach colors, sizes, and numbers. It also assesses whether the family buys and reads the newspaper and subscribes to magazines, and whether books are visible.

2. Language stimulation: This subscale contains 7 items which assess whether the child is encouraged to learn the alphabet and simple manners, and whether the parent uses correct grammar and encourages child to relate experiences.

3. Physical environment: This subscale contains 7 items which assess whether the child's environment is safe, clean and conducive to development. It also evaluates whether the building is safe, the play area is safe and free of hazards, whether the interior of the dwelling is not dark or perceptually monotonous, and whether there is adequate space for the number of persons living there.

4. Pride and affection: This subscale contains 7 items which assess whether the parent responds to the child's queries, converses with the child, holds the child close for some time during the day, spontaneously praises the child's qualitites or behavior, and caresses, kisses or cuddles the child.

5. Stimulation of academic behavior: This subscale contains 5 items which assess whether the child is encouraged to learn colors, patterned speech, spatial relationships, numbers, and how to read a few words.

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6. Encouragement of maturity (modeling): This subscale contains 5 items which assess whether some delay of food gratification is demanded of the child, whether the television is used judiciously, whether the child can express negative feelings or hit the parent without harsh reprisal.

7. Variety of stimulation: This subscale contains 9 items which assess whether the child has been taken on biweekly outings, on longer trips, and to museums. It also evaluates whether the child is encouraged to help with clean up, whether the child's art work is displayed, whether some meals are eaten with the whole family, and whether the child has some say in what foods are purchased.

8. Acceptance (use of punishment): This subscale contains 4 items which assess whether the parent scolds or derogates the child, uses physical restraint, spanks the child, or has had to use physical punishment more than once in the past week.

Appendix C

Brief Description of the Subscales of the Elementary School Version of the Home Observation for Measurement of the Environment (HOME)

1. Emotional and verbal responsibility: This subscale contains 10 items which assess whether the child has a fairly regular and predictable daily schedule, whether the parent sometimes yields to the child's fears, whether the parent encourages the child to read on his/her own and to contribute to conversation, whether the parent responds to the child's questions, uses complete sentence structure, and initiates verbal interchange with the visitor/examiner.

2. Encouragement of maturity: This subscale contains 7 items which assess whether the child is required to carry out certain selfcare routines, to keep living and play area reasonably clean, whether the parent sets limits for the child and generally enforces them, and whether the parent violates rules of common courtesy.

3. Emotional climate: This subscale contains 8 items which assess whether the parent loses his/her temper with the child, uses physical punishment more than once in past month, whether the child can express negative feelings toward the parent without harsh reprisal, whether the child has seen the parent cry or visibly upset more than once in past week, whether the child has special place to keep possessions, whether the parent uses term of endearment or a nickname for the child, and does not express overt annoyance the child.

4. Growth fostering materials and experiences: This subscale contains 8 items which assess whether the child has access to a radio or other music machine, to a musical instrument, to appropriate books, to a desk for reading or studying, whether the parent buys and reads the newspaper, whether the child has visited a friend on his/her own in the past week, and whether the family has a dictionary and the child is encouraged to use it.

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5. Provision of active stimulation: This subscale contains 8 items which assess whether television is used judiciously, whether the child is encouraged to develop hobbies and is included in the family's recreational hobby, whether the child's talents are encouraged through membership to classes or lessons, whether the child has ready access to playground equipment, to the library, and has been taken to museums and on longer trips on planes, trains, or buses.

6. Family participation in developmentally stimulating experiences: This subscale contains 6 items which assess whether the family visits or receives visits from relatives or friends at least biweekly, whether the child has been taken on a family business venture 3-4 times in the past year, whether the child has been taken to live theatre or a musical, and on a trip of more than 50 miles from home, whether the parent discusses television programs with the child and helps the child to achieve motor skills, such as riding bicylce or skating.

7. Paternal involvement: This subscale contains 4 items which assess whether the father or father substitute regularly engages in outdoor activities with the child, whether the child sees and spends time with the father at least 4 times a week, whether the child eats at least one meal a day on most days with both parents, and whether the child has remained with his/her primary family all his/her life.

8. Aspects of the physical environment: This subscale contains 8 items which assess whether the child's room has decorations appealing to children, whether the interior of the dwelling is not dark or perceptually monotonous, whether there is adequate space for the number of persons living in the home, whether the home is reasonably clean and minimally cluttered, and whether the building and the outside play environment is safe.

Appendix D

Mean (Standard Deviation) Cognitive Scores for all Children

	54-month-old children						Older children			
		RO		CB		EA		RO		CB
	n		n		n		n		n	
Stanford-Binet IQ	31	90 (13)	30	109 (9)	27	98 (15)	12	69 (14)	11	106 (8)
Verbal Comprehension	31	96 (14)	30	119 (11)	27	104 (13)	12	76 (13)	11	112 (12)
Nonverbal Reasoning	31	88 (10)	30	101 (11)	27	95 (11)	12	67 (12)	11	101 (11)
Bracken School Readiness	24	9 (3)	27	12 (3)	23	11 (2)	9	6 (2)	11	10 (3)
Position/direction	19	10 (3)	26	12 (2)	22	11 (3)	8	6 (2)	11	12 (2)
Time/sequence	18	9.5 (3)	26	11 (2)	21	10 (3)	8	6 (4)	11	11 (2)
Problem-solving tasks										
Animal House	29	15 (5)	30	19 (1)	23	19 (3)				
Coding							10	21.5 (16)	9	36 (12)
Picture Arrangement							9	3 (3)	7	7 (3)
Raven's Matrices							9	9 (2)	9	15 (6)

Appendix E

Mean (Standard Deviation) Problem-solving Strategies of 54-month-old Children

	RO		CB		EA	
	n		n		n	
Stanford-Binet						
Task orientation	31	24 (8)	30	29 (7)	27	28 (6)
Animal House	30		30		22	
Percent off-task		4 (4)		3 (7)		4 (9)
Task talk		5 (6)		5 (5)		6 (7)
Impulsive responding		7 (4)		3 (4)		4 (4)
Helpless confirmation seeking		3 (4)		0 (1)		1 (2)

Appendix F

Proportion of Older RO and CB Children using Problem-solving Strategies

Event code	n	RO Group	CB Group
Task talk	4	.75	.25
Impulsive responding*	7	.43	0
Trial and error	4	1.00	1.00
Visual scanning	4	1.00	1.00
Helpseeking questioning	4	.50	0

*$p < .05$.

Appendix G

Mean (Standard Deviation) Parent-Child Interaction Ratings on 31 Matched Pairs of 54-month-old RO and CB Children

	RO Group	CB Group
Teaching Task (TOH)		
Parent variables		
Teaching	14.8 (2.8)	15.3 (2.8)
Intrusiveness	1.5 (0.7)	1.6 (0.8)
Warmth	3.0 (0.7)	3.2 (0.6)
Encouragement of initiative	3.0 (0.7)	3.2 (0.9)
Child variables		
Engagement	18.5 (4.7)	18.7 (4.9)
Dyadic variable		
Quality of the relationship	4.7 (1.0)	4.7 (1.3)
Freeplay		
Parent variable		
Intrusiveness	1.8 (0.9)	1.7 (0.6)
Child variable		
Enthusiasm	16.5 (2.1)	17.0 (1.3)
Dyadic variables		
Quality of the relationship	5.4 (0.7)	5.5 (0.7)

Appendix H

Mean (Standard Deviation) Parent-Child Interaction Ratings on Matched Pairs of 54-month-old RO and EA Children

	No. of matched pairs	RO Group	EA Group
Teaching Task (TOH)			
Parent variables			
Teaching	24	14.6 (2.9)	14.0 (3.3)
Intrusiveness	24	1.4 (0.6)	1.7 (0.6)
Warmth	24	2.9 (0.7)	3.0 (0.8)
Encouragement of initiative	24	3.0 (0.7)	3.4 (0.8)
Child variables			
Engagement	24	18.5 (5.2)	18.3 (5.0)
Dyadic variable			
Quality of the relationship	24	4.8 (1.0)	4.8 (1.2)
Freeplay			
Parent variable			
Intrusiveness	25	1.7 (1.0)	1.4 (0.5)
Child variable			
Enthusiasm	25	16.7 (1.8)	17.2 (2.0)
Dyadic variables			
Quality of the relationship	25	5.4 (0.7)	5.7 (0.6)

Appendix I

Mean (Standard Deviation) Parent-Child Interaction Ratings on Matched Pairs of 54-month-old CB and EA Children

	No. of matched pairs	CB Group	EA Group
Teaching Task (TOH)			
Parent variables			
Teaching	24	15.6 (2.9)	14.0 (3.3)
Intrusiveness	24	1.6 (0.8)	1.7 (0.6)
Warmth	24	3.3 (0.6)	3.0 (0.8)
Encouragement of initiative	24	3.3 (0.8)	3.4 (0.8)
Child variables			
Engagement	24	18.9 (5.1)	18.3 (5.0)
Dyadic variable			
Quality of the relationship	24	4.9 (1.2)	4.8 (1.2)
Freeplay			
Parent variable			
Intrusiveness	25	1.6 (0.5)	1.4 (0.5)
Child variable			
Enthusiasm	25	16.9 (1.3)	17.2 (2.0)
Dyadic variables			
Quality of the relationship	25	5.4 (0.6)	5.7 (0.6)

Appendix J

Mean (Standard Deviation) HOME Scores on 26 Matched Pairs of 54-month-old RO and EA Children

	RO Group	EA Group
Total HOME Score	46.5 (4.2)	47.0 (3.6)
Toys and learning materials	9.3 (1.3)	8.7 (1.3)
Language stimulation	6.6 (0.9)	6.7 (0.7)
Physical environment	6.9 (0.3)	7.0 (0.0)
Pride and affection	5.2 (1.2)	5.0 (1.2)
Stimulation of academic behavior	3.9 (1.2)	4.4 (0.9)
Encouragement of maturity	3.0 (1.1)	3.7 (1.1)
Variety of stimulation	8.0 (0.9)	7.7 (1.2)
Acceptance	3.6 (0.6)	3.7 (0.6)

Appendix K

Mean (Standard Deviation) HOME Scores on 26 Matched Pairs of 54-month-old CB and EA Children

	CB Group	EA Group
Total HOME Score	47.9 (3.7)	47.0 (3.6)
Toys and learning materials	9.2 (1.4)	8.7 (1.3)
Language stimulation	6.9 (0.3)	6.7 (0.7)
Physical environment	7.0 (0.2)	7.0 (0.0)
Pride and affection	5.1 (0.8)	5.0 (1.2)
Stimulation of academic behavior	4.4 (0.9)	4.4 (0.9)
Encouragement of maturity	3.5 (1.1)	3.7 (1.1)
Variety of stimulation	8.0 (1.0)	7.7 (1.2)
Acceptance	3.8 (0.4)	3.7 (0.6)

Appendix L

Correlations between Time in Institution and Time 1 Developmenal Status Variables and Problem-solving Strategies in the RO Sample

	Time in Institution	Number of R-DPDQ Delays	Gesell AQ
Full sample			
Task orientation	-.05	-.42*	.25
54-month-old children			
Impulsive responding	.31	.08	.20
Helpless confirmation	.10	.19	-.27
Task talk	.15	-.06	-.08
Older children			
Impulsive responding	.39	.20	-
Trial and error	.31	.07	-
Helpseeking questioning	-.69	-.94*	-
Visual Scanning	-.10	-.39	-
Task talk	.10	.01	-

* $p < .01$.

Appendix M

Correlations between Family Variables and Problem-solving Strategies in the RO Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Full sample						
Task orientation	.07	-.02	-.06	.05	-.01	.14
54-month-old children						
Impulsive responding	-.28	-.12	-.47**	-.27	-.29	-.16
Helpless confirmation	-.12	-.10	-.19	.22	-.23	-.33
Task talk	-.10	-.24	-.05	.15	.01	-.02
Older children						
Impulsive responding	.34	.14	.10	.53	.29	.21
Trial and error	.03	.43	.06	.11	.16	.79
Helpseeking questioning	.12	.54	.54	.14	.60	.33
Visual Scanning	.56	.87*	.60	.62	.70	.98*
Task talk	-.43	.15	-.25	-.36	-.11	.51

* $p < .05$.

** $p < .01$.

Appendix N

Correlations between Family Variables and Problem-solving Strategies in the CB Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Full sample						
Task orientation	.13	.01	.08	-.27	.17	.05
54-month-old children						
Impulsive responding	-.20	-.24	-.30	-.22	-.04	.13
Helpless confirmation	-.10	.07	-.14	.12	-.23	.18
Task talk	.24	.11	.36	.26	.12	.21
Older children						
Trial and error	-.65	.12	-.28	-.17	-.23	-.04
Visual Scanning	-.67	-.21	.04	-.04	-.33	.28

Appendix O

Correlations between Family Variables and Problem-solving Strategies in the EA Sample

	SES	Income	Mother Education	Father Education	Mother Age	Father Age
Task orientation	.09	-.32	.04	.29	.12	-.05
Impulsive responding	-.28	-.03	-.31	-.50*	-.03	.07
Helpless confirmation	.18	-.11	-.29	.06	-.43*	-.41
Task talk	-.08	-.14	-.52*	-.23	-.30	-.21

* $p < .05$.

Appendix P

Correlations Between HOME Subscales and Cognitive Scores of the 54-month old RO Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Stanford-Binet IQ	-.08	.28	.41*	.17	.55**	.27	.23	.16
Verbal comprehension	-.01	.29	.37*	.06	.54**	.14	.24	.28
Nonverbal reasoning	-.14	.25	.34	.25	.45*	.34	.19	.02
Bracken School Readiness	-.05	.50*	.34	.39	.69**	.32	.57**	.38
Time subscale	-.30	.31	.61**	.61**	.75**	.39	.32	.35
Position subscale	-.24	.27	.33	.44	.69**	.27	.33	.33
Animal House performance	.19	.51**	.38*	.27	.44*	.12	.51**	.35

* $p < .05$.

** $p < .01$.

Appendix Q

Correlations Between HOME Subscales and Cognitive Scores of the 54-month old CB Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Stanford-Binet IQ	-.05	.30	-.14	-.08	.35*	.26	.04	.26
Verbal comprehension	.07	.12	-.07	-.06	.19	.28	.19	.25
Nonverbal reasoning	-.10	.26	-.17	-.03	.30*	.15	-.08	.18
Bracken School Readiness	.27	.37	.33	-.05	.46*	.41*	.23	-.01
Time subscale	.01	.22	.04	.25	.48*	.39*	.06	.48*
Position subscale	.08	.13	.13	.20	.30	.30	.19	.27
Animal House performance	.43*	.73**	.06	-.13	.80**	.34	.39*	.13

* $p < .05$.

** $p < .01$.

Appendix R

Correlations Between HOME Subscales and Cognitive Scores of the 54-month old EA Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Stanford-Binet IQ	.44*	.41*	--	.22	.35	.29	.48*	.15
Verbal comprehension	.31	.50**	--	.36	.41*	.37	.36	.02
Nonverbal reasoning	.24	.27	--	.13	.29	.31	.29	.29
Bracken School Readiness	.47*	.33	--	.05	.49*	.34	.42*	-.05
Time subscale	.35	.60**	--	.35	.76**	.02	.02	-.26
Position subscale	.29	.56**	--	.20	.60**	.09	.13	.11
Animal House performance	.32	.18	--	-.22	.31	-.13	-.27	-.10

* $p < .05$.

** $p < .01$.

Appendix S

Correlations Between HOME Subscales and Problem-solving Strategies of the 54-month old RO Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Task orientation	-.26	.31	.24	.06	.38*	.17	.42*	-.06
Impulsive responding	-.01	-.32	-.15	-.24	-.04	-.22	-.29	-.31
Helpless confirmation	-.06	.14	.03	-.05	.16	.13	.26	.02

* $p < .05$.

Appendix T

Correlations Between HOME Subscales and Problem-solving Strategies of the 54-month old CB Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Task orientation	.12	.44*	-.03	.30	.41*	.28	.21	.17
Impulsive responding	-.42*	-.49*	-.32	.36*	-.51*	-.17	-.13	.18
Helpless confirmation	-.32	-.39*	-.15	.06	-.41*	-.05	-.14	.08

* $p < .05$.

Appendix U

Correlations Between HOME Subscales and Problem-solving Strategies of the 54-month old EA Children

	Toys	Language stimulation	Physical environment	Pride & affection	Academic stimulation	Maturity	Variety	Acceptance
Task orientation	.31	.57**	--	.35	.51**	.05	.32	.32
Impulsive responding	-.12	-.52*	--	-.33	-.54**	-.08	-.05	.10
Helpless confirmation	-.24	-.16	--	.11	-.02	.20	.14	-.02

* $p < .05$.

** $p < .01$.

Appendix V

Correlations Between HOME Subscales and Cognitive Scores of Older RO Children

	Responsibility	Maturity	Emotional climate	Growth fostering	Active stimulation	Family participation	Paternal involvement	Environment
Stanford-Binet IQ	.46	.53	.46	.27	.40	.54	.44	.32
Verbal comprehension	.49	.70*	.51	.42	.45	.73**	.55	.11
Nonverbal reasoning	.36	.45	.35	.18	.40	.45	.42	.39
Bracken School Readiness	-.15	.69*	.32	-.08	.46	.10	-.10	.05
Time subscale	-.11	.81*	.49	.36	.75*	.24	-.17	.00
Position subscale	-.17	.74*	.35	.11	.55	.04	-.35	-.16
Coding performance	-.28	.49	-.05	.10	.71*	.29	.32	.05
Picture Arrangement performance	-.25	.37	.08	-.03	.61	.27	.16	.34
Raven's Matrices performance	-.30	.59	.05	.71*	.59	.05	.07	.42

* $p < .05$.

** $p < .01$.

Appendix W

Correlations Between HOME Subscales and Cognitive Scores of Older CB Children

	Responsibility	Maturity	Emotional climate	Growth fostering	Active stimulation	Family participation	Paternal involvement	Environment
Stanford-Binet IQ	-.05	.41	-.40	.15	.15	.05	.38	.21
Verbal comprehension	.50	.43	.22	.33	-.06	-.17	.26	.66*
Nonverbal reasoning	-.43	.30	-.55	.01	.14	.18	.31	-.24
Bracken School Readiness	.02	.61	-.64*	.43	.36	.14	.25	-.05
Time subscale	-.16	.43	-.68*	.14	.38	.10	.30	-.03
Position subscale	.05	.52	-.51	.51	.33	.24	.13	.31
Coding performance	.17	.45	-.44	.57	.07	.26	.02	.51
Picture Arrangement performance	.33	.23	.48	.62	-.14	-.30	-.70	.14
Raven's Matrices performance	.37	.22	-.03	.43	.09	.16	-.18	.22

* $p < .05$.

Appendix X

Correlations Between HOME Subscales and Problem-solving Strategies of Older RO Children

	Responsibility	Maturity	Emotional climate	Growth fostering	Active stimulation	Family participation	Paternal involvement	Environment
Task orientation	.54	.25	.00	-.06	.24	.27	.62*	.18
Impulsive responding	-.63	.25	-.47	-.06	.28	-.64	.09	.15
Trial and error	.16	.50	-.54	.51	.63	.50	.92*	-.92*
Helpseeking questioning	.36	.19	.01	-.43	.26	-.08	-.23	.23
Visual Scanning	-.19	.87*	-.15	.57	.88*	.49	.53	-.53
Task talk	.73	.14	-.58	.20	.39	.33	.87	-.87*

* $p < .05$.

Appendix Y

Correlations Between HOME Subscales and Problem-solving Strategies of Older CB Children

	Responsibility	Maturity	Emotional climate	Growth fostering	Active stimulation	Family participation	Paternal involvement	Environment
Task orientation	-.14	.24	-.52	.13	.18	-.27	-.18	.42
Trial and error	.12	-.44	.03	.08	-.09	.13	-.54	.14
Visual Scanning	.24	-.02	-.02	.35	-.15	.03	-.48	.44