

The Development of Adopted Children after Institutional Care: A Follow-Up Study

Panayiota Vorria¹, Zaira Papaligoura¹, Jasmin Sarafidou², Maria Kopakaki¹, Judy Dunn³,
Marinus H. Van IJzendoorn⁴, & Antigoni Kontopoulou⁵.

¹ Department of Psychology, Aristotle University of Thessaloniki, Greece

² Institute of Child Health, Athens

³ Social, Genetics, and Developmental Psychiatry Centre,
Institute of Psychiatry, London, SE5 8AF, U.K

⁴ Centre for Child and Family Studies, Leiden University, The Netherlands

⁵ Metera Babies Centre, Athens, Greece

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Abstract

Background: Research suggests that institutional care has long lasting effects on children. However, no study has longitudinally studied infants in an institution and their subsequent development at age four. **Methods:** 61 adopted children aged four years who had spent their first two years of life in an institution were compared to 39 children reared in their own two parent families. Cognitive development, security of attachment, shyness, children's emotional understanding and behavioural problems, were examined in both groups. Parental health and stress were also assessed **Results:** At four years adopted children still had lower scores on cognitive development, were less secure, and less able to understand emotions than family reared children. Children with a secure attachment type in infancy were found to be less secure at age four, compared with those who were classified in infancy as having an insecure attachment type. Their physical development, had recovered, they were less shy, had no behavioural problems and no problems in the relationship with their teacher. **Conclusions:** Early residential group care has long lasting effects on important socio-emotional and cognitive aspects of preschool children's development. **Keywords:** adoption, attachment, follow-up study, social and cognitive development, residential care, pre-school children.

The Development of Adopted Children after Institutional Care: A Follow-Up Study

The detrimental effects of institutional care on children's development have been shown in previous studies (Vorria, Rutter, Pickles, Wolkind, & Hobsbaum, 1998a, 1998b; Vorria et al., 2003). Children reared in institutions had difficulty in forming secure relationships and were indiscriminately friendly, irrespective of the quality of care provided (Hodges & Tizard, 1989a, 1989b; Tizard & Hodges, 1978; Tizard & Rees, 1974, 1975; Zeanah, Smyke, Koga, Carlson, & The Bucharest Early Intervention Project Core Group, 2005).

Recent studies in Romanian orphanages have showed that once adopted, children made remarkable developmental and behavioural gains, when compared with those left behind in the orphanage (Chisholm, 1998; Marcovitch et al., 1997). In terms of cognitive development, Romanian children, adopted after having experienced severe early deprivation for 24 months, had cognitive scores within the normal range at the age of 4 years while their physical development also showed an impressive change (Rutter & the English and Romanian Adoptees Study Team, 1998).

In a previous study in Greece, Tsitsikas, Coulacoglou, Mitsotakis, and Driva, (1988), studied the development of adopted children aged 5½ to 6½ years who had spent the first 3-36 months of their lives at the Metera Babies Centre. It was shown that although physical development and health of the adopted children were satisfactory, compared to their classmates at school, they presented more behaviour problems and they were slow in verbal abilities, social competence, motor development, practical reasoning, writing and drawing.

Adopted children present more behavioural problems than those brought up in their own families. The precise sources of these difficulties have not yet been fully recognized. Possible explanation for these difficulties might be that these problems are due to the early experiences that many of these children had in institutions, or are due to the fact that the biological families of these children often faced serious social and psychiatric problems; or even to the difficulty of children to cope with the complications arising from the awareness of adoption, (Brodzinsky, 1984, 1987).

The present study examined children who after spending their first two years of life in the Metera Babies Center were adopted. To our knowledge this is the first study,

which investigated the development of children who in residential care had formed either a secure or an insecure type of attachment with their caregiver and experienced a change in their attachment figure when they were removed from the institution to be adopted. This study can be considered as a ‘natural intervention’ (Rutter, Pickles, Murray, & Eaves, 2001; van IJzendoorn & Juffer, in press) as it makes possible to examine whether children when subsequently placed in a nurturing environment, manage to recover from the initial adverse experiences. Furthermore, it allows the comparison of these children with a control group raised from birth in more regular circumstances, and the investigation of whether the adopted children catch-up in various domains of development.

Originally, the adopted children were being reared in a socially and emotionally disadvantaged and under-stimulating environment; i.e. low infant/caregiver ratio, and little social interaction (Vorria, et. al., 2003). They had adverse early experiences, were separated from their caregiver and thus experienced a loss from their initial attachment figure. In the original study the children were seen at the age of 12-18 months while still living in the institution. The results of the first study showed between group differences in all aspects of infants’ development. In the present study the following research questions were examined. First, we examined whether the adopted children compared to a family-reared control group differed with respect to security of attachment, cognitive development, and emotional understanding. We also investigated the relationship of the child with his or her school teacher. We examined the quality of parenting and stress in adoptive mothers. Second, we investigated whether the significant differences in social, emotional and cognitive development found between the two groups in the initial study when infants were 12 to 18 months old, (Vorria et al., 2003) remained after the institutionally reared children were adopted.

Method

Participants

In the present follow-up study the participants were 61 adopted children (32 boys age: mean 4.2 years, range = 3.8–4.6 and 29 girls age: mean 4.2 years, and range 3.8–4.8). The mean age at which these children were adopted was 1 year and 8 months, ($SD =$

0.7) (range 11 months and 6 days- 3 years and 5 months). The adopted children had been in their new homes 2 years and 4 months ($SD = 0.7$) (range 7.5 months–3 years and 3 months). Cognitive development, vocabulary development, emotional understanding and security of attachment were independent of age of adoption or time spent in the adoptive home

Thirty children in the adopted group were living in the Athens area while 31 children were living in the country.

In the comparison group there were 39 children (20 boys age: mean = 4.2 years, range = 3.8-4.7 and 19 girls age: mean = 4.2 years, range = 3.8-4.8) who had a mean age of 4.2 years ($SD = 0.2$). All children in the comparison group but one lived in Athens.

In the initial study the participants were 86 infants 11 - 18 months old (42 boys and 44 girls) who were reared in an institution, the “Metera Babies Centre”, in Athens, and 41 (21 boys and 20 girls) infants who were reared at home and attended full-time day care centre of low quality (Vorria et al., 2003). The two groups were matched for age and sex. From the 86 infants in the original residential group care sample 67 (78%) were adopted, 14 (16%) returned to their biological families, 3 (3%) were fostered, and 2 (2%) children were still living in the “Metera Babies Centre”. In the adopted group the participation at follow-up was 91% while in the comparison group it was 95%.

The mean age of adoptive mothers was 41.8 years, ($SD = 4.1$), and of adoptive fathers was 44.1 years, ($SD = 4.1$). The mean duration of maternal education for adoptive mothers was 12.3 years, ($SD = 3.7$), and for the adoptive fathers 12 years ($SD = 3.6$). The mean age of comparison mothers was 35.7 years ($SD = 4$), and for fathers 39.0 years, ($SD = 4.5$). As expected there was a significant difference in parental age ($t = 7.2, p < .001$, for mothers, and $t = 5.8, p < .001$, for fathers). Adoptive parents were older than the parents in the comparison group. The mean duration of maternal education for comparison mothers was 13.3 years ($SD = 2.5$), and for fathers 12.4 years, ($SD = 3.0$).

Forty-three of the adoptive children and all the comparison children attended a day care centre on a full-time basis, and for the comparison children this day care centre was the same as the one they attended in infancy. These centres were understaffed and they provided extremely low quality of care (Vorria et al., 2003).

Data Collection Procedures

The study involved a multiple method assessment of all infants and their mothers. All adoptive families were initially contacted by the “Metra Babies Centre”. Those who agreed to participate were visited at home. If the children attended a day care center their caregivers completed a questionnaire regarding their relationship with the child.

The families were visited by two research assistants, trained in the study techniques, and a psychologist. Each home visit lasted at least three hours. In many cases a second visit was necessary in order to complete the data collection. The research assistants who administered the tests were blind as to which group each child belonged. Once the child felt at ease with the researcher, the assessment procedure began. All mothers completed questionnaires about the child’s behaviour, temperament, and relationships as well as about their health and parental role. If the children attended a day care centre, their teacher completed the Student – Teacher Relationship Scale.

Assessments and Interviews

The Attachment Q-Sort (AQS) (AQS; v.3.0; Waters, 1987). The observer-version of the Attachment Q-Set was employed. In a recent meta-analysis, van IJzendoorn, Vereijken, Bakermans-Kranenburg and Riksen Walraven (2004) report a modest correlation between the observer AQS and the Strange Situation assessment, but rather strong associations with parental sensitivity, and they conclude that the observer Q-sort can be used as an alternative to the Strange Situation. With this method, a child is considered to be secure when the congruence between the observed child and an expert-rated “optimally secure” child is high. The Pearson correlation coefficient (r) expresses the degree of correspondence between the child’s distribution and the security criterion sort. Two research assistants independently sorted the cards on the basis of a minimum of three hours of observation in the child’s home for all children. The inter-observer reliability on the complete sort was $r = .77$.

The Attachment Story Completion Task (ASCT) (Bretherton, Ridgeway & Cassidy, 1990). The ASCT was used to assess children’s representations of relationships with the attachment figures (both mother and father). Five story-stems (spilled juice, hurt knee, monster in the bedroom, parents’ departure, and reunion) were used. The procedure was video-taped and transcribed verbatim. Coding was performed on anonymized

transcripts and independently for each story stem, so as to prevent carry-over effects. Six key thematic codes were selected to capture structural and content characteristics of children's narratives (Golby, Bretherton, Winn & Page, 1995; Page & Bretherton, 1995). The four structural codes included: Bizarre-atypical themes, avoidance, story resolution, and narrative coherence. The two content codes included: prosocial and negative themes, each comprising of several more specific content themes describing detailed aspects of parent-child interaction. The content themes were coded as present or absent within each story narrative and summed across the five stories, scores ranging from 0 to 5.

Subsequently, themes were aggregated to form the prosocial and negative content codes.

20% of the transcripts were blindly coded by a second coder. Intraclass correlation coefficients were .94 for bizarre-atypical themes, .96 for avoidance, .98 for story resolution, .95 for narrative coherence, .90 for prosocial themes and .97 for negative themes. The AQS security score was correlated with ASCT story resolution ($r = .29, p < .01$), narrative coherence ($r = .31, p < .01$) and prosocial themes ($r = .23, p < .030$), which provided some evidence for convergent validity.

McCarthy Scales of Children's Abilities (MSCA) (McCarthy, 1972). Children's cognitive development was assessed using the MSCA.

British Picture Vocabulary Scale (BPVS) (Dunn, Dunn, Whetton, & Pintille 1982) was employed to assess children's vocabulary skills.

Denham Puppet Scenario (Denham, 1986) was employed to assess children's understanding of emotion. The puppets had detachable faces that depicted happy, sad, angry, and afraid expressions. The researcher enacted 22 vignettes and asked the child to choose the one that corresponded to the perceived emotion of the puppet in each scenario. An aggregate score was derived by summing the number of the positive answers for each of the three parts. Cronbach's alpha was .77.

Maternal Questionnaires

Colorado Children's Temperament Inventory (CCTI) (Plomin & DeFries, 1985). There are four subscales (five items each): activity, negative emotionality, shyness and sociability. Cronbach's alphas for these subscales were .40, .56, .70, and .22, respectively. Internal consistency for the total scale was .46. Given the low reliability of the total score and the subscales only the shyness subscale was used.

Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997, 1999). Cronbach's alpha for the total difficulties score was .75.

Parenting Stress Index Questionnaire (PSI) (Abidin, 1995). In order to assess quality of parenting the full-length PSI was completed by all mothers. The Cronbach's alpha for the Total Stress Scale was .95.

General Health Questionnaire (GHQ) (Goldberg & Williams, 1988). The GHQ-28, contains four subscales: somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression. Cronbach's alphas for these subscales were .89, .85, .72, and .65 respectively, and for the total score .90.

Student-Teacher Relationship Scale (STRS) (Pianta, 1992). When the children attended a day care centre their teacher completed the STRS. It consists of 30 items and assesses teachers' perceptions of their relationship with the child. It yields a total score and the conflict/anger, closeness and dependency subscales. Cronbach's alphas for these were .72, .74 and .55 respectively and for the total score was .73. Given the low reliability the dependency subscale was not used in the analysis.

Results

Differences between the Adopted and Comparison Group Children at Age Four

Weight and height. The mean for the weight of the adopted children was 17.9 kg ($SD = 2.6$) and for the comparison children was 18.4 kg ($SD = 2.3$). The mean height for the adopted children was 106 cm ($SD = 3.4$) and of the comparison children it was 105.1 cm ($SD = 4.1$). Multivariate analysis of variance showed non-significant results [Wilk's $L = .95$, $F = (2.83) = 2.04$, $p = .14$]. Univariate tests were also non-significant for both weight [$F(1, 84) = 1.06$, $p = .30$] and height [$F(1, 84) = 1.15$, $p = .29$].

Insert Table 1 About Here

Security of attachment. Between group differences on Q-Set security score showed that adopted children had a lower score than the comparison children in the security of attachment (see Table 1).

The Attachment Story Completion Task (ASCT). Significant between group differences were found regarding the ASCT. MANOVA for the group effect on the ASCT content and structural codes, was significant [Wilk's $L = .75$, $F(6, 89) = 4.96$, $p < .001$]. Univariate tests showed that adopted children had a lower score than the comparison children for story resolution, narrative coherence, prosocial themes and a higher score on avoidance, while differences in atypical and negative themes were not significant (see Table 1).

Cognitive development. The adopted children had lower scores on cognitive development than the children in the comparison group. The multivariate analysis of variance (MANOVA), for the group effect on the McCarthy subscales, was significant [Wilk's $L = .80$, $F(5, 95) = 4.81$, $p = .001$]. Univariate tests were also significant for all the subscales (see Table 1).

Denham Puppet Scenario. The adopted children had a lower score than the comparison children on the emotional understanding.

Between group differences on BPVS, shyness, SDQ and total score of the STRS were not significant. MANOVA for the group effect on STRS subscales was also not significant [Wilk's $L = .98$, $F(2, 72) = .85$, $p = .43$] as well as univariate tests in STRS subscales (see Table1).

Gender differences were examined by two way analysis of variance of all the above variables on gender and group. Group by gender interactions were not significant. No significant gender effect was found except for STRS. MANOVA of STRS subscales, gave a significant gender effect [Wilk's $L=.90$, $F(2, 70) = 3.92$, $p = .02$]. Univariate tests suggested higher scores for girls on closeness [$F(1, 71) = 5.04$, $p = .03$] and lower scores on anger/conflict [$F(1, 71) = 4.13$, $p = .05$]. Group effects, after taking into account gender differences, were still non significant.

ASCT content and structural codes were also correlated with cognitive development. McCarthy general cognitive index (GCI) was found to be positively correlated with story resolution ($r = .40$, $p < .01$), narrative coherence ($r = .40$, $p < .01$), prosocial themes ($r = .36$, $p < .01$), and negatively correlated with avoidance ($r = -.27$, $p < .01$). Multivariate analysis of covariance for the group effect on ASCT, with GCI as a covariate, showed that between group differences were still significant [Wilk's $L = .83$,

$F(6, 88) = 2.89, p = .013$]. Univariate tests showed that, after adjustment for cognitive development, differences between the adopted and comparison groups for story resolution, narrative coherence, prosocial themes and avoidance, remained significant.

Differences between Adoptive Mothers and Mothers in the Comparison Group

Parenting Stress Index Questionnaire (PSI). Multivariate comparison between adoptive and comparison mothers on the PSI yielded a non-significant result [Wilk's $L = .80, F(14, 85) = 1.55, p = .11$]. There were no significant differences between adoptive and non adoptive mothers for the total score [$t(98) = 1.70, p = .09$] of the PSI as well as for the life events [$t(98) = 1.17, p = .25$].

General Health Questionnaire (GHQ). Adoptive mothers had significantly lower total scores on the GHQ [$t(98) = 4.03, p < .001$]. Multivariate comparison between the adoptive and the comparison mothers for the GHQ subscales yielded a significant result [Wilk's $L = .79, F(4, 95) = 6.41, p < .01$]. Adoptive mothers showed fewer somatic symptoms [$t(98) = -2.85, p < .01$], anxiety-insomnia [$t(98) = -3.20, p < .01$], and severe depression [$t(98) = -4.48, p < .01$], no difference was observed in social dysfunction [$t(98) = -1.05, p = .30$].

Development from Age 1 to Age 4

The goal of the present study was to examine whether differences in cognitive development and attachment relations found between the adopted children and the comparison children could be attributed, partly or totally, to the developmental differences and attachment types as assessed in infancy.

Insert Table 2 About Here

Cognitive development and Denham Puppet Scenario. Table 2 shows the results of hierarchical regression analyses of each of the McCarthy scales and the Denham Puppet Scenario at four years of age, on Bayley mental and motor scales entered at the first step and adoption status at the second. Only predictors that were significant at the first step were included at the second step. Mental development assessed in infancy was significantly associated with all cognitive and emotional indices at four years, whereas motor development was associated only with Perceptual-Performance Index. After

adjustment for these effects, differences between adopted and comparison groups were still present for General Cognitive Index, Perceptual-Performance Index, Memory Index, Motor Index and Denham Puppet Scenario. However, Verbal Index and Quantitative Index no longer differed between adopted children and comparisons, after controlling for relevant differences in infancy.

Early Attachment Relations and Later Development

Insert Table 3 About Here

Table 3 shows the means and *SD*'s in security of attachment at the age of four years (Attachment Q-Sort) according to attachment type in infancy (ISS). Two-way ANOVA on groups (adopted - comparison) and security of attachment in infancy (B versus non B) showed no significant interaction [$F(1, 81) = .46, p = .50$]. ANOVA revealed significant main effects of both group [$F(1, 82) = 7.8, p = .01$] and attachment type (B versus non B) [$F(1, 82) = 4.51, p = .02$]. In four year olds the security of attachment to the adoptive mother was significantly lower in the children who were classified in infancy as securely attached to their caregiver compared with those who were classified as non B (A, C or D). Similar results were obtained when the few cases of A and C type were excluded from the analysis. Adopted children who as infants were securely attached to their caregiver in the institution showed less attachment security to their adoptive mother at age four, compared to the infants with disorganized attachment in infancy. The same was true for the comparison children.

Similar analyses were conducted for the ASCT. MANOVA of the ASCT parameters did not reveal significant differences between children with secure (B type) and non secure (A, C or D) types of attachment in infancy [Wilk's $L = .87, F(6, 75) = 1.80, p = .110$].

Discussion

One of the main research questions of the present study was to establish whether there were differences in cognitive social and emotional development between adopted

children and children reared in their two parent families. Adoption constitutes a drastic change in the lives of the Metera children, and after adoption their physical development did indeed recover and they also became less shy. There were no between group differences in behavioural problems at home or in their relationship with the teacher in the day care centre. However, at four years of age the adopted children still had lower scores on cognitive development, were less secure, and less able to understand emotions than family reared children.

Physical Development

The physical development of the adoptive children showed improvement at age four. This is consistent with research on Romanian adoptees (O'Connor, et al., 2000; Rutter, & the ERA Study Team, 1998) where by four years no differences were found in weight and height between the adoptive and family reared children. This might be an indication of better adjustment of the adopted children, as during infancy their weight and height were lower than the comparison infants, although nutrition in the institution was of good quality (Vorria et al., 2003).

Another positive change was seen in shyness where the between group differences disappeared after adoption. This could be the result of the richer social experience provided in the adoptive homes compared with the restricted experiences in the institution.

It is interesting that there were no differences between the adopted and the family reared children in student-teacher relationship, and in behavioural problems which implies a positive outcome for the adopted children.

Age of adoption and the time spent in the adoptive home did not affect any aspect of the child's development. It seems that the crucial factor affecting adoptive children's development was that they had spent their first, approximately, two years of their lives in residential group care.

Attachment

The adopted children who were reared in infancy in an institution experienced a vast change in their lives as they were adopted by parents who highly desired them and who were psychologically healthy. The present study, in accordance with previous research (Golombok, 2000) showed that adoptive mothers, as compared to comparisons,

had less anxiety, fewer somatic symptoms, and less depression. However, the adoptive children were less secure in their attachment relationships than the comparison children. It could be that because they have spent approximately their first two years of their lives in residential group care this consulates to their failure to develop secure attachment relationship with their adoptive parents. It has been documented that infants and young children develop attachment relationships with their adoptive parents (Juffer, Bakermans-Kranenburg & van IJzendoorn, 2005), but a longer period may be needed for an attachment bond to emerge. However, one cannot exclude the possibility that the group differences reflect a genetic predisposition.

Regarding attachment representations, the fact that adopted children constructed narratives that contained fewer prosocial interactions between parent and child figures, were more incoherent and avoidant during story-telling and less likely to produce adequate story resolutions to the central conflict of each story stem may suggest that, compared to family reared children, they have internalized less secure internal working models of attachment. Research on narrative representations has shown that lack of attention to or denial of the central story conflict, inability to provide an adequate story resolution or becoming disorganized or incoherent in face of emotionally charged information can be regarded as indirect signs of insecurity of attachment (Bretherton et al., 1990; Main, Kaplan & Cassidy, 1985; Oppenheim, 1997; Oppenheim & Waters, 1995). The prosocial themes, the degree of narrative coherence and story resolution were significantly correlated with Q-set security scores, which is in accordance with the view that narrative measures reveal children's internal working models of attachment.

The second research question investigated in the present study was whether the significant differences in cognitive, social and emotional development observed between children raised in an institution and those reared in their own two-parent families remained, even after the institutionally reared infants were adopted.

Early Attachment and Later Development

Adopted and comparison children whose attachment type was classified in infancy as disorganized had, on the Q-sort at four years, higher security scores compared to those classified as securely attached in infancy. However, no association was found between attachment type in infancy and attachment representations of the children at age

four assessed with the Attachment Story Completion Task. Thus, no safe conclusions can be drawn regarding security of attachment in infancy and security at age four.

Furthermore, the Q-sort does not measure attachment disorganization, the type of attachment observed in the majority of the group care infants. Moreover, since we are dealing with an atypical population, infants reared in an institution, it is possible that the ratings of attachment applied in typical populations may not be applicable to this group of children (Cicchetti, Toth & Lynch, 1995; Zeanah et al., 2005). It is also important to note that in the comparison group there was also a tendency for children classified as having a disorganized type of attachment in infancy to be more secure at age four than those previously classified as secure. If the finding applied only to the adopted children a number of possible interpretations could be presented, i.e. disruption of attachment or unattached infants classified as having formed attachment relationships (Zeanah et al., 2003). However, it should be noted that the control children classified as secure in infancy were also less secure at age four, it appears that a further follow-up of the children is needed to explain the finding and would allow more valid conclusions to be drawn.

Cognition

In cognitive development, the between group differences observed in infancy were still evident at age four, possibly because time spent in the adoptive home was not enough to allow recovery from the experiences in the institution. Previous research has shown that differences in cognitive development between adopted and family reared children remained in the preschool years and disappeared during the school years (Tizard & Hodges, 1978). Thus, for a change to become evident in mental development a longer period of time is required. However, it is also possible that genetics contributed to the levels of ability in the adopted children, since many of the biological parents of the group care infants suffered from serious mental health problems or mental retardation (Vorria et al., 2003).

It is interesting to note that the between group differences for general cognitive, perceptual-performance and motor indices were independent of cognitive development in infancy. Therefore, the between group differences found at the age four, cannot be attributed to the fact that the adopted children had lower scores than the comparison

children in infancy. In contrast, between group differences in verbal and quantitative indices disappeared after adjustment for cognitive development in infancy. This suggests that the between group differences in verbal and quantitative indices might be due to the between group differences in infancy.

Emotional Understanding

The results showed that the adoptive children were less able to understand emotions than family reared children. This was expected, as understanding emotions has been associated with family experiences, and shown to be linked to participation in discussions about feelings and relationships (Dunn & Hughes, 1998). It is possible that the adoptive children needed a longer period of time to recover from the lack of such experiences during infancy.

Conclusion

Institutionalization during the first two years of life is a salient experience with long lasting effects on children's development. At the same time, the transition to an adoptive home certainly stimulates the physical development, sociability, and assertiveness of the adopted children, as well as their behavioural adjustment. Institutional upbringing, however, for the first two crucial years of life had lasting effects on cognitive development and attachment relationships. A follow-up study of these children is needed in order to examine whether these effects are still present during the school years.

Table 1

Group Differences in Security of Attachment, Cognitive and Emotional Development

	Adopted children			Comparison children			t	p
	n	Mean	(SD)	n	Mean	(SD)		
AQS: security	61	.50	(.18)	38	.60	(.13)	2.92	.004
ASCT: atypical themes	57	1.5	(1.7)	39	1.1	(1.6)	.61	.541
Avoidance		.6	(.5)		.2	(.3)	4.14	<.001
story resolution		1.0	(.6)		1.5	(.4)	-4.62	<.001
narrative coherence		4.7	(1.9)		6.8	(1.9)	-5.11	<.001
prosocial themes		4.8	(2.7)		7.2	(3.0)	-4.14	<.001
negative themes		1.6	(1.5)		1.1	(1.5)	1.63	.107
McCarthy scores:								
general cognitive index	61	100.1	(13.0)	39	110.9	(11.9)	4.18	<.001
verbal index		50.2	(7.6)		55.3	(7.5)	3.23	.002
perceptual-performance		50.0	(9.6)		58.1	(9.3)	4.14	<.001
quantitative index		49.4	(8.5)		53.4	(6.3)	2.52	.013
memory index		45.7	(8.0)		51.4	(7.8)	3.47	.001
motor index		51.4	(8.9)		59.6	(8.1)	4.65	<.001
picture vocabulary	61	99.2	(12.7)	39	103.1	(18.4)	1.29	.202
Denham puppet scenario	60	19.4	(5.8)	39	23.4	(4.4)	3.69	<.001
CTI: shyness	61	9.3	(3.3)	39	8.9	(3.1)	-.72	.476
SDQ: total	61	10.0	(4.6)	39	9.9	(4.5)	-.06	.949
STRS: total	37	125.2	(9.8)	38	126.1	(13.3)	.36	.721
closeness		44.9	(5.6)		44.4	(7.6)	-.34	.736
conflict/anger		19.6	(5.3)		17.9	(6.9)	-1.18	.243

Table 2

Group Differences in Cognitive Development and Emotional Understanding at Four Years of Age Adjusting for Development in Infancy (Hierarchical Regression)

McCarthy scales	step	Predictors	beta	t	Significance
General cognitive					
index	1	Bayley mental scale	.403	4.184	<.001
	2	Group	.214	2.217	.029
Verbal					
index	1	Bayley mental scale	.402	4.017	<.001
	2	Group	.130	1.301	.196
Perceptual-					
performance index	1	Bayley mental scale	.214	1.899	.061
		Bayley motor scale	.185	1.661	.100
	2	Group	.214	2.098	.039
Quantitative					
index	1	Bayley mental scale	.235	2.181	.032
	2	Group	.129	1.199	.234
Memory					
index	1	Bayley mental scale	.227	2.160	.033
	2	Group	.223	2.120	.037
Motor					
index	1	Bayley mental scale	.301	3.056	.003
	2	Group	.291	2.960	.004
Picture					
Vocabulary	1	Bayley mental scale	.381	3.599	.001
	2	Group	-.050	.470	.640
Denham puppet					
scenario	1	Bayley mental scale	.346	3.456	.001
	2	Group	.205	2.046	.044

Group codes: 1=adopted, 2=comparison

Table 3

Association between Type of Attachment in Infancy (ISS) and Security of Attachment in Four Year Olds (AQS)

Attachment Type (ISS)	AQS security					
	Adopted			Comparison		
	n	M	(SD)	n	M	(SD)
B	16	.44	(.20)	10	.57	(.18)
A	2	.49	(.24)	3	.62	(.06)
C	3	.61	(.05)	8	.63	(.12)
D	35	.54	(.16)	8	.61	(.08)
Total non B	40	.54	(.15)	19	.62	(.09)

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Correspondence to

Panayiota Vorria

Aristotle University of Thessaloniki

Department of Psychology

Thessaloniki 54124

Greece

Tel: 01030310 997326

Fax: 01030310 200724

Email: vorria@psy.auth.gr

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