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## Health problems in children adopted from Romania Association with duration of deprivation and behavioural problems

This paper by **Celia Beckett, Jenny Castle, Christine Groothues, Thomas G O'Connor, Michael Rutter** and the **English and Romanian Adoptees (ERA) study team\*** examines the pattern of health problems as reported by parents in a group of children adopted from Romania and relates these findings to outcomes at age six. The study is based on a representative sample of 165 children, 144 of whom had experienced institutional deprivation, and a UK adoptee group of 52 non-deprived UK adoptees. At the time of UK entry, over half of the children adopted from Romania had marked health problems. The majority had suffered severe malnutrition and there was a high incidence of respiratory, skin and gastro-intestinal infections; 13 per cent had antibodies to hepatitis B. At age six, 17 per cent of the children had conductive hearing loss, 12 per cent had continuing strabismus and 35 per cent skin problems; half of those infected with hepatitis B were still surface antigen positive. Inattention/overactivity at age six was found to be more likely in children who had been exposed to prenatal and postnatal health risks. The children who had quasi-autistic features were also more likely to have strabismus. There were no associations found between health risks and either cognitive outcomes or attachment problems. The risk of inattention/overactivity for children who have suffered marked deprivation was increased for those who had additional health risks.

**Celia Beckett is a PhD student at the Social, Genetic and Developmental Psychiatry Research Centre, Kings College London**

**Jenny Castle and Christine Groothues are research workers at the same centre**

### Introduction

During the past decade there has been an increase in intercountry adoptions into the UK of children reared in institutions in Eastern Europe, Asia and South America. The numbers of children adopted from institutional care have also increased in the USA and in other European countries (Gunnar *et al*, 2000).

Between 1989 and 1992, following the Romanian revolution, some 324 children came to England for adoption from Romania. The great majority were seriously developmentally delayed and physically malnourished (Rutter *et al*, 1998) and continuing social/behavioural sequelae at six years of age were evident in a substantial minority of the children (Rutter *et al*, 2001). In addition, medical problems have been a key concern for many adopting parents (Johnson *et al*, 1992; Marcovitch *et al*, 1995; Fisher *et al*, 1997). In this paper, we describe the health problems, as reported by parents, in 165 children adopted from Romania, 144 of whom were adopted from institutions. The rates are compared with those of 52 UK children adopted before the age of six months. Associations between health problems and behavioural outcomes are examined.

### Health problems of children adopted from institutions

Several observers (Ames, 1990; Reich, 1990; Kaler and Freeman, 1994) have described the very poor conditions in Romanian institutions and the major health problems among children adopted from institutions have been noted (Jenista, 1992; Johnson, 2000). In one Romanian study of 1,025 children still in institutions, over a third of the children were HIV seropositive (Patrascu *et al*, 1990). In another study of 169 children in Romania, the great majority showed antibodies to hepatitis B and a third were hepatitis B surface antigen positive (Rudin *et al*, 1990). Comparable figures for hepatitis B in a study of 58 infants adopted were 53 per cent and 20 per cent (Johnson *et al*, 1992). Significantly, the children with serological evidence of hepatitis B were older than non-infected children and had spent a longer time in institutional care.

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\* Diana Bredenkamp, Carla Croft, Judy Dunn and Jana Kreppner

These findings have suggested horizontal transmission (probably via contaminated needles) rather than vertical transmission from the mother.

A number of studies have shown that children living in institutions are also exposed to other marked health risks (Frank *et al*, 1996) and that children who are adopted from institutions into good care continue to have a range of health problems, particularly in the initial period following adoption (Johnson, 2000). The incidence of upper respiratory infections and subsequent middle ear pathology is high in institutions (Frank *et al*, 1996). This may lead to impaired hearing with consequent adverse effects on speech development, although serious language delay would not be expected (Haggard *et al*, 1990; Maw, 1995; Bennett and Haggard, 1999). Strabismus (squint) has been found in a quarter of children in Romanian institutions (Johnson, 2000), a rate well above UK norms (Pringle *et al*, 1966) possibly as a result of biological risk factors such as prematurity (Johnson, 2000). One study of Romanian adoptees in the USA found intestinal infections, including parasitic infections, in 33 per cent of children (Johnson, 2000). Dental problems stemming from poor nutrition have also been noted in a fifth of international adoptees (Jenista, 1992). Missing or damaged teeth were common in the older adoptees, and delayed eruption together with small deformed teeth were common even in early-adopted children.

Children from extremely deprived backgrounds may have been exposed to pre-birth risks resulting in low birth weights and possible risks for cognitive and behavioural development (Holloman and Scott, 1998; Taylor *et al*, 2000). Children with poor nutritional status and marked medical problems may be at greater risk of developmental delay (Miller *et al*, 1995) and reduced cognitive scores (Lien *et al*, 1977). Other studies suggest that the major effect of marked malnutrition may be on children's behavioural development, including problems such as increased distractibility and difficulties in social functioning (Richardson *et al*, 1972; Grantham-McGregor *et al*, 2000). Furthermore, when malnutrition is

exacerbated by acute diarrhoea there may be more marked consequences for delayed development, particularly for low birth weight babies (Morris *et al*, 1999).

### **Limitations of previous studies**

The majority of studies of health problems in intercountry adoptees are based on clinic samples (Jenista, 1992; Johnson 2000) and may therefore not generalise to other adoptees. In addition, few studies to date have examined the changes in health over time or the implications of the health problems for later development. Longitudinal studies are needed to assess the longer-term implications of early exposure to marked deprivation.

The current study seeks to extend prior research on the health problems of children adopted from institutions by assessing change in health problems over time, and by examining possible links between health problems and behavioural and cognitive outcomes. Although it was expected that a variety of health problems would be relatively common at the point of adoption (Johnson *et al*, 1992), it was less clear whether these problems would resolve over time. Furthermore, although connections between health and behavioural problems have been previously reported, it is not clear if this connection is merely a consequence of a common aetiology, namely deprivation. This possibility is examined in this report.

### **Method**

#### *The sample*

The total sample comprised 165 children adopted from Romania, aged between a few weeks and 43 months when they entered the UK: 91 girls and 74 boys. The children were selected by a random sampling approach, stratified for the duration of deprivation from the larger number of 324 children adopted into the UK from Romania between February 1990 and September 1992, who were processed through the Department of Health and/or the Home Office.

Of the adoptive families who were approached, 81 per cent agreed to take part in the study. Adoptive parents were asked to give their written consent to the

**Tom O'Connor is Associate Professor of Psychology at the University of Rochester, New York State**

**Michael Rutter is Professor of Developmental Psychopathology at the Social, Genetic and Developmental Psychiatry Research Centre, Kings College London**

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study, and approval was obtained from the Institute of Psychiatry Ethics Committee. Eighty-five per cent of the children joined their UK adopted family from institutional care (144 children), defined as a minimum of two weeks in an institution. The majority (85 per cent) had been placed in an institution by their parents because of extreme poverty. Of these, only four per cent (five children) had spent a year or more living with their families before being so placed. The children who did not come from institutions had also generally experienced very poor rearing conditions, but not the degree of deprivation of those who experienced institutional care.

The study also includes a group of 52 within-country adoptees, all of whom were placed by six months of age between 1989 and 1991: 34 boys and 18 girls. The sample of UK adoptees was restricted to children with no apparent disability who had been placed as young infants. This was to avoid any confounding factors that would result from the special circumstances of children with disabilities, or older children who had been exposed to a variety of risk factors prior to adoption. These children were all placed by voluntary or local authority adoption agencies and the majority (50/52) had been relinquished for adoption. Forty per cent of these infants (20) were born to teenage mothers and 12 were known to have concealed their pregnancies (Castle *et al*, 2000). All the children had received good quality care before they were placed with their adopters. None of the UK adoptees had experienced serious psychological privation, but there may have been some increase in prenatal risks.

The study commissioned by the UK Department of Health started in 1993, two or more years after the children had joined their families from Romania. There were no arrangements by UK authorities for medical examinations to be carried out routinely on the children when they arrived in the UK, so information on the children's health has been collected through parent interviews, together with limited medical reports from Romania. Not all adoptive parents immediately sought medical advice, unless there was a

health problem, and uniform data were not available. Where it has been possible to verify data from medical reports held at the Department of Health (as part of the entry procedure), this has been done. This information was completed in Romania as part of the entry clearance records (BAAF, 1994).

#### *Measures*

Adoptive parents were interviewed by trained interviewers using a comprehensive, semi-structured interview. Parents were asked about health problems at placement (related retrospectively) and any ensuing problems up to the age six-year assessment. Specific items asked in the interview covered a range of potential health problems, obstetric and birth difficulties and specific health problems as a result of living in institutional care identified in the pilot stage of the study; parents were also asked to report any other health problems.

Parents of the children who were younger on arrival were first interviewed when the children were four years old and again at six years old. The parents of children who were over two years on arrival were only seen at six years. The period of re-call of initial health problems was between two and four years. Parents had frequently spent a considerable time in Romania negotiating the placements and therefore were in a unique position to be able to make first-hand observations of the children's health and well-being. They also had met the birth parents and talked with them through an interpreter; 76 per cent of the adopters had met the birth mother.

The children's cognitive abilities were assessed at age six by the McCarthy scale of abilities (McCarthy, 1972). In order to assess inattention/overactivity at age six the parents and teachers were asked to complete the Rutter scales (Elander and Rutter, 1996). These included five items on these behaviours and has acceptable levels of reliability and validity (Rutter *et al*, 2001). In analyses below, we report significant levels of inattention/overactivity by combining data from parents and teachers. Significant inattention/overactivity was based on scores in the top

ten per cent according to parent or teacher report (or both) and at least above the median according to the second report.

In order to assess possible autistic features, the parents completed the Autism Screening Questionnaire (ASQ; Berument *et al*, 1999). In addition the Autism Diagnostic Interview-Revised (ADI-R; Le Couteur *et al*, 1999) was administered when parental interview reports suggested the possibility of autistic features (Rutter *et al*, 1999).

Attachment problems were assessed from questions in the parent interview on the child's differentiation between adults, readiness to go off with a stranger and lack of checking back in an anxiety-provoking situation (O'Connor *et al*, 2000a).

#### *Data analyses*

Outcomes were analysed, first according to whether or not the child was a UK (n = 52) or Romanian adoptee (n = 165). Comparisons were then made within the sample who experienced institutional care (n = 144) according to duration of such care: nought to six months (n = 43); more than six months but less than 24 months (n = 44); and 24 months or over (n = 45). The number of children from Romania who did not experience institutional care was too small to warrant a separate analysis. This analytic strategy allowed us to ascertain the comparative rates of health problems overall in the deprived and non-deprived groups, and to establish which health problems showed a dose response relationship between the duration of institutional deprivation and the presence of health problems. An examination was then made of associations between the health factors and later behavioural problems.

### **Results**

#### *Background information to health assessments and behavioural adjustment*

The British Agencies for Adoption and Fostering (BAAF, 1994) intercountry adoption form (ICA) had been completed by parents for 144 out of 165 children. This information included some birth details. The mean birth weight of the children from Romania was 2,812 grams,

one-and-a-half standard deviations below UK levels (Boyce, 1993); 41 (28 per cent) had birth weights below 2,500 grams, with nine of these below 1,500 grams. In the UK adoptee sample, the mean birth weight was 3,167 grams, .63 standard deviations below the norm; five children (ten per cent) had a birth weight below 2,500 grams, two below 1,500 grams (a pair of twins who had been born prematurely). There were three multiple births in the Romanian sample and one in the UK adoptee group. For 17 of the families adopted from Romania, there were confirmed reports of obstetric difficulties. This included 13 children who were known to have been born very prematurely, two whose mothers were known to have been alcoholics, and two whose mothers were known to have experienced marked stress during pregnancy. There were also further undocumented reports of difficulties.

Twenty-two of the children were said to have been placed or have stayed in the institution because of health problems: 14 as a result of acute illnesses, generally respiratory infections; four because of prematurity; two because of minor disabilities (one cleft palate and one dislocated hip); and two cases of malnutrition.

More than 30 per cent of all the children from Romania were reported as having a major health problem when they joined their new families. In five cases, placement had to be delayed because of health problems (pneumonia in two cases and marked dysentery in one, hepatitis B in another and marked malnutrition in the fifth). Some parents who met their child in Romania before the child was able to leave the institution witnessed changes in their child during this period as a result of infections; in three instances the deterioration in the child was very marked. Many of the children initially were unwell, with gastro-intestinal, respiratory and other health problems due to malnutrition. The children were generally severely malnourished; children who came from institutional care had a mean weight of more than two standard deviations below the British norm (O'Connor *et al*, 2000b) when they joined their families. Weight at entry was found to

have an independent effect on cognitive levels at age six when age at entry was controlled for (O'Connor *et al*, 2000b).

There were four cases of rickets and one of marked persistent anaemia. Systematic data were not available on old injuries, but these were noted in four cases, head injuries in two cases and scarring from an untreated burn in another and from an unknown cause in a fourth case. One child had a cleft palate and three children had minor malformations to their fingers or toes.

By the age of six years, behavioural and cognitive problems were evident in a substantial minority of the children from Romania. Cognitive impairment, inattention/overactivity, quasi-autistic features and attachment difficulties were also significantly associated with duration of deprivation (Rutter *et al*, 2001). Emotional and conduct problems were not elevated in this sample.

#### *Specific health problems*

*Severe diarrhoea* Thirty-two percent of the Romanian sample had severe diarrhoea

when they first joined their families, in comparison with four per cent of the UK sample (Fisher's exact test  $p < .001$ ).

These gastro-intestinal problems were significantly associated with duration of deprivation among those who came from institutional care (Chi-square for trends,  $\chi^2(1) = 9.73, p < .01$ ).

The severe diarrhoea was usually the result of parasitic or other infections; giardia (a parasitic infection) was diagnosed in 14 cases, dysentery in five cases, and there was one case of roundworm; in other cases the diagnosis was not specified. Once appropriate treatment had been given, virtually all of these infections cleared up, but for a few children the symptoms persisted for up to a year or more after they joined their families. One child was still suffering from marked diarrhoea at the age of six. Several of the children with giardia transmitted infections to other family members before it was diagnosed.

*Skin problems* Fifty-two per cent of the children from Romania had skin com-

Table 1

#### Health problems according to institutional care and duration of institutional deprivation

Health problem	History	UK adoptees n = 52	Non-institution adoptees n = 21	<6 months in an institution n = 43	6-24 months in an institution n = 44	>24 months in an institution n = 45
Severe diarrhoea	At placement	2 (4%)	4 (9%)	9 (20%)	16 (30%)	23 (51%)
	At age six	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (2%)
Skin problems	At placement	4 (8%)	5 (24%)	28 (62%)	28 (52%)	25 (56%)
	At age six					
	Mild	5 (10%)	3 (14%)	15 (34%)	15 (28%)	20 (42%)
	Moderate/Marked	0 (0%)	0 (0%)	0 (0%)	2 (4%)	3 (7%)
Hepatitis B seropositive	At placement	0 (0%)	1 (5%)	2 (4%)	9 (17%)	8 (18%)
	At age six	0 (0%)	1 (5%)	0 (0%)	4 (8%)	5 (11%)
Strabismus	History	5 (10%)	3 (14%)	9 (20%)	12 (22%)	4 (9%)
	At age six	2 (4%)	2 (10%)	4 (9%)	11 (20%)	3 (6%)
Hearing problems	History	8 (15%)	3 (14%)	5 (11%)	11 (20%)	16 (33%)
	At age six					
	Mild	7 (14%)	0 (0%)	3 (7%)	2 (4%)	6 (13%)
	Moderate/ Marked	1 (2%)	0 (0%)	3 (2%)	7 (13%)	9 (20%)
Poor calcification of teeth	History	1 (2%)	3 (14%)	4 (9%)	10 (19%)	9 (20%)
	At age six	1 (2%)	2 (10%)	4 (9%)	8 (15%)	7 (16%)

plaints when they joined their families compared with eight per cent of the within UK adoptees (Fisher's exact test,  $p = .001$ ). Within the institutional sample there was not a linear pattern in the incidence of skin complaints according to duration of institutional care.

At placement there were 15 children with a marked nappy rash; in some instances the sores and abscesses were so deep they took months to heal up. Three children had parasitic infections. Four of the UK adoptee group had marked skin problems with infantile eczema. Milder problems were slight eczema, dry and flaky skin.

By the age of six the children who continued to have moderate or marked skin problems were confined to the Romanian sample (Fisher's exact test  $p < .001$ ). The continuing problems included two cases of scabies and one of herpes. The frequency of skin problems at six years was not related to the duration of deprivation. Girls were more likely to have initial skin problems than boys: 27 per cent girls and 14 per cent boys. None of the other health problems were associated with gender.

*Hepatitis B* Twelve per cent of the Romanian sample had tested positive for antibodies to the virus either before or on arrival in the UK. None of the UK adoptee group had hepatitis B (Fisher's exact test  $p < .01$ ). Although the children who had been longer in institutional care were more likely to have contracted hepatitis B, this trend fell short of statistical significance. By the age of six, ten children had converted to hepatitis surface antigen B negative, ie they had cleared the virus, and ten were still positive. By six there was a relationship between duration of deprivation and the children who continued to be surface antigen positive (Chi-square for trends,  $\chi^2(1) = 4.51$   $p < .05$ ). The children who were younger when they joined their families had all cleared the virus by age six.

*Strabismus* Eighteen per cent of the Romanian adoptees and ten per cent of the UK adoptee children were reported to have strabismus (squint). The difference

between the two groups was not statistically significant, nor was it associated with the duration of deprivation in the Romanian sample.

At age six, the number of children who had continuing strabismus was not significantly higher in the Romania sample, nor was there any association with duration of deprivation.

Strabismus was significantly more likely in the Romanian sample for those with a birth weight of 2,500 grams or less than in those with a birth weight of above 2,500 grams, 32 per cent vs 11 per cent (Chi-square,  $\chi^2 = 9.63$   $p < 0.01$ ). There was no association between strabismus and birth weight in the UK sample.

*Hearing problems* Otitis media (middle ear infection) giving rise to hearing problems and requiring treatment was reported for 21 per cent of the Romanian sample and 15 per cent of the UK adoptee group, the difference between the two being non-significant. In the Romanian sample the incidence was significantly associated with the duration of deprivation (Chi-square for trends,  $\chi^2(1) = 8.90$ ,  $p = .01$ ).

At age six hearing problems were not significantly more likely in the Romanian sample, but the severity of the problems was greater. Two per cent of the UK adoptee group (one child) continued to have moderate or marked problems and 12 per cent of the Romanian sample (17 children), all of whom were over six months on joining their families, carried on having moderate or marked problems. Within the Romanian institutional sample the relationship between continuing hearing problems at age six and length of deprivation remained significant (Chi-square for trends,  $\chi^2(1) = 8.52$ ,  $p < .01$ ). At age six many of the hearing problems had been treated (the insertion of grommets, repairs to perforated eardrums), but some of the children needed further treatment.

*Dental problems* The main dental problem reported by the parents was poor calcification of teeth; the first teeth were in very poor condition, discoloured and crumbled. This was the case for 26 children (16 per cent) in the Romanian sample

compared with only two of the comparison group (Fisher's exact test  $p < .01$ ). There were no associations within the Romanian group with the duration of deprivation.

At age six there continued to be a significantly higher number of children in the Romanian sample with ongoing problems with their teeth (Fisher's exact test  $p < .001$ ), but no association with the length of deprivation.

### **Association between health, behavioural and cognitive outcomes**

#### *Romanian sample*

No associations were found between any of the health problems and either cognitive impairment or disinhibited attachment.

Forty-one children in the Romanian sample showed inattention/overactivity problems at age six; the proportion was significantly greater in those children who had been exposed to longer periods of deprivation (Rutter *et al*, 2000). Inattention/overactivity in the Romanian sample from institutional care was found to be significantly associated with several health problems even when duration of deprivation was taken into account.

Eleven of the 17 children (65 per cent) with reports of obstetric difficulties (prematurity, exposure to alcohol and exposure to stress) showed inattention/overactivity as compared with 24 per cent of the remainder ( $\chi^2 = 11.72$   $p < .01$ ). This association remained significant when the children's age on leaving Romania was taken into account through a logistic regression  $p < .001$ .

Twenty-one of the 41 children (51 per cent) who reached the threshold for inattention had suffered from severe diarrhoea at the time of placement compared with 26 of the 100 children (26 per cent) who did not ( $\chi^2 = 8.32$   $p < .01$ ). This difference was still significant when controlled for the age the child had left Romania ( $p < .05$ ). Only six of the children who reached the threshold for inattention/overactivity had experienced both known obstetric problems and severe diarrhoea.

Children who tested positive to hepatitis B antibodies were also significantly more likely to have inattention problems

at age six ( $\chi^2 = 8.68$   $p < .01$ ) with 11 of the 41 children (27 per cent) with inattention having tested positive for hepatitis B antibodies as compared with nine of the 99 children (nine per cent) without inattention. When the presence of severe diarrhoea was entered into the logistic regression the association was no longer significant.

Twenty of the children had been found to have autistic-like features; these behaviours were also associated with length of deprivation (Rutter *et al*, 1999). Strabismus was significantly more frequent in the children with quasi-autistic features, with six of the 20 (29 per cent) having continuing strabismus age six ( $\chi^2 = 5.92$   $p < .05$ .) compared with 12 of the remaining 124 (15 per cent). A logistic regression showed that this association was not accounted for by duration of institutional care. There was no association with problems in pregnancy, birth weight and the quasi-autistic features.

Quasi-autistic features were also significantly associated with hearing impairments at age six; seven of the 20 children (35 per cent) with autistic features compared with 23 of the remaining 124 (19 per cent) had continuing hearing impairments ( $\chi^2 = 4.15$   $p < .05$ ), but when a logistic regression was run to account for the association with duration of deprivation this was no longer significant.

#### *UK adoptee sample*

There were no associations between health problems and behavioural or cognitive outcomes in the UK adoptee sample.

### **Discussion**

This study relies on the use of parent reports of health problems as there were no routine assessments on arrival. Clearly this has some limitations as the parent reports are subject to deficiencies in memory re-call and to interpretation of the severity of a problem. This paper is not attempting to provide a clinical report of the health problems, but to explore the health problems reported by parents, their persistence and any association with later outcomes.

Our findings on health problems are relevant to both the children's health

needs at the point of joining their adoptive families and their later progress. The former is recognised by the UK authorities in terms of the requirement that children adopted from abroad have a medical examination in their country of origin as part of the entry clearance procedure. Such examinations vary greatly in quality and, in the case of children from Romania, clearly failed to identify key problems and key needs for treatment. A comparison in the USA between country of origin findings and the findings of paediatric examination showed important misdiagnoses of undetected medical conditions in the country of origin assessments (Albers *et al*, 1997). The diagnosis and treatment of chronic diarrhoea is of particular urgency because of the high risk that giardia will be transmitted to other family members. Skin problems are very common (affecting half of the children from Romania we studied) and required treatment as in any other children. Most responded to appropriate intervention and marked problems rarely persisted to age six years, although mild problems were more frequent. Chronic otitis media leading to hearing impairments as a result of large perforations or the destruction of the tympanic membrane was a continuing problem in many children, with hearing impairment a significant concern at age six years in a fifth of those who had been in institutions for at least two years. Ear infections are, of course, very common in any group of children but it was evident that, in this sample of institution-reared children, treatment had often been so seriously inadequate that chronic damage resulted. Several children required repair of the eardrum in the middle years of childhood.

Some health problems were associated with adversities during the prenatal and infancy periods. The available Romanian data on the pregnancy was inadequate but it was evident that, compared with UK norms, there was a higher rate of low birth weight and short gestation. Given good antenatal and postnatal care, this would probably carry little risk but in its absence, particularly in combination with marked maternal stress during the pregnancy and malnutrition after birth, the

risks may be much greater (see Holloman and Scott, 1998; Rini *et al*, 1999; Taylor *et al*, 2000; O'Connor *et al*, 2002). An important part of the obstetric risk, however, may stem from the exposure of the foetus to high levels of maternal alcohol in the early months of pregnancy. We lack good data on the frequency of foetal alcohol exposure but the evidence suggests that it is a significant risk factor for some children.

Parents are often unaware of the lasting effects on dentition of poor nutrition during pregnancy and infancy. Both children's first set of teeth and their later acquired second set are laid down during intra-uterine development. Inadequate calcification at that early developmental stage is likely to lead to continuing poor calcification and the attendant risks of dental caries, even after good nutrition is provided after adoption. It is, therefore, especially important that dental advice be obtained early after adoption when the children are still young.

Strabismus was only slightly more frequent in adoptees from Romania, but it was significantly more common in those with an unusually low birth weight. It requires the same treatment as in any other group of children.

It is noteworthy that, with the exception of poor calcification of the teeth, and to a lesser extent skin problems, health concerns were not particularly marked in the small sub-group of children from Romania who had not been reared in institutions. The health risks were largely a function of markedly depriving institutional care and most such risks increased with the duration of institutional deprivation. Prospective adoptive parents should be aware of the risks and the need to obtain appropriate medical and dental care as soon as possible after the child enters the family.

However, the significance of health problems may be even greater with respect to their association with the children's psychological development. It might have been anticipated the greatest effect would have been on cognitive impairment, but this proved not to be the case. No association was found between any of the health problems and cognitive out-



comes at six years of age. Rather the main effects were seen in relation to inattention/overactivity, which was associated with obstetric complications, chronic diarrhoea and hepatitis B. The mechanisms mediating this association remain unclear, but the link was not just a function of the duration of institutional deprivation. It was necessary to examine this possibility because both the health risks and inattention/overactivity were more frequent in the children who experienced the longest periods of institutional deprivation. The logistic regression analyses, however, showed that the association between health risks and inattention/overactivity still held after taking duration of institutional care into account. Chronic diarrhoea has previously been found to be associated with an increased risk of delayed development (Morris *et al*, 1999). Severe chronic malnutrition has been associated with adverse behavioural outcomes (Grantham-McGregor *et al*, 2000). It is difficult to determine the extent to which these sequelae are a consequence of malnutrition per se, rather than associated psychosocial adversities.

The only other association between health risks and psychological outcome concerned that between strabismus and quasi-autistic features. It is unlikely that this represented any kind of direct risk and it is not known what other risk it indexes. The association between hearing impairment and autistic features proved to be a function of the duration of institutional care, although the possibility that hearing impairment in early life constituted part of the risk process cannot be ruled out.

### Conclusions

Previous findings from our study of Romanian adoptees have shown that the greatest risks for psychological problems probably derive from the marked psychosocial deprivation associated with upbringing in poor-quality, understaffed institutions that provided little opportunity for communication or interaction between caregivers and children. However, the findings of health problems show that they constitute a significant part of the risk for inattention/overactivity. The mechanisms underlying the

association remain obscure but they warrant more systematic study than they have received so far.

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