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Adopted children's language difficulties and their relation to symptoms of reactive attachment disorder: FinAdo study

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ABSTRACT

This study investigated the potential association between symptoms of reactive attachment disorder and language difficulties among internationally adopted children in Finland (the FinAdo study). The language difficulties were assessed using a standardised Five to Fifteen (FTF) parental questionnaire and the symptoms of reactive attachment disorder using a FinAdo questionnaire. The study sample consisted of 689 6–15 year old children (49.2% boys, response rate 48%). Twenty-nine percent of the children were reported to have language difficulties and 8% severe language difficulties (10% and 2%, respectively, in the general population). A child's symptoms of reactive attachment disorder were associated with language difficulties and severe language difficulties, *OR* 2.15, 95% CI [1.39, 3.31] and *OR* 4.33, 95% CI [1.57, 11.98], respectively, the associations being robust to adjustments for background factors.

Language has a unique role in human social interactions. We share our intentions, thoughts and desires with others mainly through speech and language. Although genetic factors have a role to play, especially in the pathogenesis of language disorders (Kang & Drayna, 2011), it is known that language cannot be acquired without social context (e.g., Fromkin, Krashen, Curtiss, Rigler, & Rigler, 1974). The initial role of joyful mother–child interactions and joint attention as well as imitation are already reflected in the first 6 months prior to the learning of words and phrases (e.g., Bruner, 1977; Camaioni, 1989). Reciprocation of the imitation seems to be crucial: mothers also tend to imitate the child and thus reinforce those of the child's gestures that are more likely to take on a communicative meaning (Camaioni, 1989). A growing body of later studies have confirmed these early observations about the important role of positive parent–child experiences in a child's language development (Rafferty, Griffin, & Lodise, 2011; Tamis-LeMonda, Bornstein, & Baumwell, 2001). A study by Kuhl, Tsao, and Liu (2003) has indicated the crucial role of human interaction in the language learning process among 9-month-old infants. In their experiments the child's ability to learn a foreign language was studied either in the presence of another person or via television or audiotape only. Thirty-two infants were exposed to foreign language provided by a live person whereas 32 infants received foreign-language exposure from auditory–visual (16 infants) or auditory only (16 infants) DVD movies. Those who were exposed to the foreign-language material without human interaction showed no phonetic learning although infants of the same age learned from a live person.

Another study has found a difference in the way children learn communication depending on whether they were playing with mothers or with same-age peers. A peer partner seemed to invite no more conventionalised acts than the total lack of a partner (Bakeman & Adamson, 1986). Parents tend to use linguistically simplified and acoustically exaggerated speech in the communication with their infants. A recent study tested 19 six-month-old and 17 thirteen-month-old infants' brain responsiveness to infant-directed speech versus adult-directed speech using ERP methods. The results indicated that the infants' neural activity to infant-directed speech was increased compared to adult-directed speech (Zangl & Mills, 2007).

Internationally adopted children live their first months or even years in an environment that is very different from the rest of their life. Children brought up in institutions, in particular, often lack primary caregiving, cognitive stimulation and some of them may have experienced psychological and physical neglect (Kaler & Freeman, 1994; Muhamedrahimov, Palmov, Nikiforova, Groark, & McCall, 2004; Smyke et al., 2007; Verhulst, Althaus, & Versluis-den Bieman, 1990). In some institutions infants are reported to spend up to half

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of their time alone (Tirella et al., 2008) or spend as little as 12 min with their caregiver during 3 h of waking time. During these times, caregivers often do not talk or interact socially with the child and their responsiveness to children's signals is low (Muhamedrahimov et al., 2004), which means the child has few positive caregiver–child experiences as well as little opportunity to gain language skills from adults. Even though the quality of early caregiving varies much between various institutions or foster homes, children who are internationally adopted appear to be at higher risk of language difficulties than their non-adopted age-mates (Hwa-Froelich, 2009; Scott, Roberts, & Glennen, 2011).

Childhood adversity has an effect on the developing brain and the child's cognitive development as well (Bücker et al., 2012; McCrory, De Brito, & Viding, 2011). The complex process by which environment shapes developing brains and behaviour is still under research. It is known that synaptogenesis increases in the first years of life (Kolb & Gibb, 2011) and there are indications that neural connections with respect to different learning processes may be organised in temporally limited sensitive periods in infancy, including attachment behaviour (Sullivan & Holman, 2010) and language learning (Sharma & Campbell, 2011).

However, among children who are internationally adopted details of the factors associated with poor language outcomes after adoption are largely unclear. Most of these children experience a complete change in their language environment and have to learn a new language. Differing from the typical monolingual or bilingual language learners, adopted children have to shift from one language to another (Hene, 1988). There are some indications of different language learning strategies after adoption in children from different countries (Hwa-Froelich & Matsuo, 2010). Adopted children's expressive language skills seem to develop more slowly than receptive language skills, at least among children adopted from China (Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008). The sentence comprehension abilities of children who have been internationally adopted have also been found to lag behind at school age compared to their age-matched peers, especially among those adopted from institutions (Desmarais, Roeber, Smith, & Pollak, 2012). Overall, an institutional upbringing before adoption (Beckett et al., 2006; Loman, Wiik, Frenn, Pollak, & Gunnar, 2009) and older age at adoption have both been repeatedly associated with poor language outcomes (Croft et al., 2007; Glennen & Masters, 2002; Scott et al., 2011). The effect of late adoption age has also been explained by the adverse environment to which late-adopted children have been exposed for a longer time (Scott et al., 2011).

Other risk factors for poor language outcomes of children who have been internationally adopted include those relating to the child's background and adoptive family. These risk factors include prenatal drug exposure, which may affect the risk of children's language delays between continents (Davies & Bledsoe, 2005). Prenatal cocaine exposure is reported to be common in Latin America (Davies & Bledsoe, 2005). Children adopted from Eastern Europe, on the other hand, are reported to have a relatively high rate of fetal alcohol exposure; they are also characterised by low birth weight and a long time spent in an institution during infancy (Landgren et al., 2006) all of which would increase their risk of delayed speech and language development through associated neurological problems (Glennen & Masters, 2002). Of familial factors, single-parent household (Wadsworth, Burnell, Taylor, & Butler, 1985) and lower socioeconomic status of the family (Hackman, Farah, & Meaney, 2010) have commonly been associated with language difficulties, but at least the association with socioeconomic status is inconsistent among children who have been internationally adopted (Croft et al., 2007). As the adopted children grow older their language problems seem to be more evident than when they were toddlers, presumably because of the increased need for higher linguistic skills (Scott et al., 2011).

In addition to the severe consequences for cognitive development, an abusive or deprived environment is also known to lead to disturbances in social relatedness. This disorder, called Reactive Attachment Disorder (RAD), is described in both ICD-10 (International Statistical Classification of Diseases & Related Health Problems 10th Revision (ICD-10), 1992) and DSM IV (Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, 1994). RAD is typically divided into two subtypes—inhibited and disinhibited. However, a study in which 32 toddlers living in a large institution in Romania were compared with 29 toddlers in a unit designed to reduce the number of adults caring for each child and 33 never-institutionalised toddlers revealed that mixed subtypes are also common (Smyke, Dumitrescu, & Zeanah, 2002). The inhibited subtype is described as a child's resistance to initiate or respond to social interactions. These children are emotionally withdrawn. They do not seek comfort from others and their social reactions, especially when in distress, are typically inhibited, vigilant or ambivalent. Disinhibited children's attachment behaviour is typically non-selective or indiscriminate, but at the same time shallow and superficial. The child readily goes off with strangers and shows limited differentiation among adults and a lack of checking back with the parent in stressful situations. The symptoms of attachment disorder are typically manifested with the closest attachment figures such as the parents (Boris, Zeanah, & Work group on Quality Issues, 2005; Rutter, Kreppner, & Sonuga-Parke, 2009). The symptoms of RAD have been found to be associated with other psychiatric and developmental symptoms such as learning difficulties (Gleason et al., 2011; Raaska, Elovainio, et al., 2012) as well as with later social difficulties manifested as school victimization and bullying behaviour (Raaska, Lapinleimu, et al., 2012).

RAD appears likely to emerge among high-risk populations like children in foster care (Zeanah et al., 2004) or internationally adopted children (Boris et al., 2005). The development of the symptoms of RAD has mainly been studied among children adopted from severe deprivation in Romanian institutions. In the Bucharest Early Intervention Study (BEIP) 68 children from Romanian institutions were placed into foster care with special support. Their signs of RAD were compared with those of 72 never-institutionalised children and 68 children who continued in institutional care. Findings in this study suggest that the two types of RAD have significantly different courses. The signs of inhibited RAD reduced markedly after children from institutions were placed into quality foster care. In comparison with children in the never-institutionalised group their signs of inhibited RAD were indistinguishable when the children had been with families an average of 8 months. Reduction of symptoms of disinhibited RAD, however, was not as clear. Despite children in the foster care intervention having lower scores of disinhibited RAD than those in the institutions at some ages, they still scored higher compared with children who had never been institutionalised (Smyke et al., 2012). The persistence of disinhibited behavior as a part of the so-called Deprivation specific patterns (DSP) has also been indicated in the ERA-study (English and Romanian Adoptees Study). In this study among children adopted from Romanian institutions the persistence of DSP, including disinhibited attachment, has been shown to be very high, up to the age of 15 (Kreppner et al., 2010).

The present study investigates whether the difficulties in a child's social reciprocity, as manifested by symptoms of RAD, are associated with the child's language difficulties after adoption. In this study we mainly focused on two hypotheses for this potential association. First, the same adverse experiences are known to harm both the child's language development and social development, resulting in symptoms of RAD. Second, knowing the research findings concerning the crucial role of social reciprocation in a child's language development, we hypothesised that children's aberrant reciprocity may harm their language development after adoption. We tested these hypotheses by analysing the potential association between a child's symptoms of RAD at the time of adoption and later language difficulties in a multivariate analysis. The effect of the child's background factors associated with long-term deprivation, such as institutional background and late adoption age, were studied by adding them to the multivariate analysis. This examines whether the association between language

difficulties and symptoms of RAD is robust to adjustments. In addition, we were interested to discover which factors in the child's background and in the current family are associated with language problems.

Methods

Participants

This study is part of the ongoing FINnish ADOption Study (FinAdo study). The target population in the FinAdo study consists of all children who were internationally adopted through the three legalised adoption services in Finland between 1985 and 2007. The Ethics Committee of the Hospital District of Southwest Finland has approved the study, and informed written consent was obtained from the parents and the children themselves. Parents were sent questionnaires exploring facts about the child, the adoptive family and the parents themselves. The surveys were conducted between December 2007 and March 2009 and included two mailings for non-respondents. The FinAdo cohort of under 18-year-old children included 1450 children who had been internationally adopted (634 boys, 44%) with a mean age of 7.5 years (*SD* 4.4) at the time of study entry. The participation rate for the FinAdo study was 55.7%. In the FinAdo data older children were more likely to be non-responders, *OR* 1.06, 95% CI [1.04, 1.08], $p < .001$. There was no significant gender difference between respondents and non-respondents, the response rate for boys being 55% and for girls 57%, ($p = 0.34$). The comparisons regarding the child's country of origin were made by comparing the FinAdo respondents with the data for all Finnish children who had been internationally adopted in the reports of The Finnish Board of Inter-country Adoption Affairs (Ministry of Social Affairs and Health, Finland). The comparisons reveal that there was no major difference between the respondents' country of origin and all the children who have been internationally adopted in Finland.

In this study we used the subsample of the age group 6–15 years. Sufficient information was given by 689 children (339 boys, 49.2%), who formed the final sample. The response rate for this age group was 47.8%.

Measures

Child-related background factors

The parents answered a series of questions about the child's background and health in a questionnaire developed for the FinAdo study. The background variables included the child's gender, age at parents' responses and at adoption, country of birth, the type and number of preadoption placements (classified as 1. *foster home only,* 2. *orphanage only,* and 3. *more than one placement before adoption*). The country of origin was categorised according to continent: 1. *Asia* (*China, Thailand, Philippines, India*), 2. *Eastern Europe* (*Russia, Romania, Estonia, Poland*), 3. *Africa* (*Southern Africa, Ethiopia, Mozambique*), and 4. *Latin America* (Columbia, Guatemala). Children who had been diagnosed with autism ($n = 8$), mental retardation ($n = 21$), cerebral palsy ($n = 11$) or deafness or hearing impairment in both ears ($n = 4$) in Finnish medical evaluations were excluded from the analysis (total excluded $n = 38$). Furthermore, the parents were requested to report on a child's potential general developmental delay diagnosed in Finnish medical evaluations, and this was taken into account in the statistical analysis.

Psychosocial characteristics of the adoptive family

We classified the family's socioeconomic status (SES) into four categories according to the vocation of the parent with the higher SES in the family (upper middle class, lower middle class, working class and other). The parents' marital status was categorised to separate single-parent households from those with both parents. A depression subscale with five items was derived from the General Health Questionnaire (GHQ) (Goldberg et al., 1997) to evaluate symptoms of parental depression. Various versions of the GHQ-12 have been reported to be useful in determining the presence of depressive disorders (Aalto, Elovainio, Kivimäki, Uutela, & Pirkola, 2012). The internal consistency (Cronbach's alpha coefficient) of the scale in the present data was .79 for the fathers' questionnaire and .80 for the mothers'. We asked whether the parent had recently been able to enjoy his/her daily duties, been thinking of himself/herself as a worthless person, felt unhappy and depressed, lost his/her self-confidence, or felt quite happy. The questions were answered on a 4-point scale: 1 = *more than usual*, 2 = *as much as usual*, 3 = *less than usual*, 4 = *much less than usual*. The first and last items were reverse coded and all items were summed.

Child's language skills

Information about each child's language skills was collected through a Five to Fifteen (FTF) parental questionnaire. This is a validated screening questionnaire concerning a child's behavioural or developmental problems. It comprises 181 items grouped into eight domains (memory, learning, language, executive functions, motor skills, perception, social skills, and emotional/behavioural problems). In this study we evaluated 21 questions in the language domain: comprehension (5 questions), expressive language skills (13 questions) and communication (3 questions). In the previous validation study the Cronbach's alpha values for these subdomains were .84, .84 and .75, respectively. The FTF language domain and the Wechsler Intelligence Scale for Children (WISC) Verbal IQ and Verbal Comprehension Index (VCI) have been shown to be strongly correlated ($p \leq .01$) (Kadesjö et al., 2004; Trillingsgaard et al., 2004). In the questionnaire each item has three ratings: 0 = "*does not apply*, 1 = "*applies sometimes or to some extent*", 2 = "*definitely applies*". A mean problem score has been calculated for each domain to produce a demarcation line of clinical concern. The demarcation line of the 90th percentile (meaning that 90% of the general population score lower) is used to mark the beginning of clinical concern, and scores over the 98th percentile (98% of the general population score lower) are considered to correspond to severe problems in that area. In this study we used three categories: "*no difficulties*" for those children who scored under the 90th percentile line, "*difficulties*" for those scoring on the 90th percentile or over it and "*severe difficulties*" for those whose scores were on or over the 98th percentile line (Kadesjö et al., 2004). The category of "*difficulties*" also included children with severe difficulties.

Symptoms of reactive attachment disorder

In the FinAdo parental questionnaire we included questions about the child's typical symptoms of RAD (six items). We asked the parents to evaluate the severity of symptoms at arrival in the family and the persistence of symptoms. The behavioural symptoms to be assessed were whether the child: "readily went off with a stranger", "had lack of checking back with the parent even in a stressful situation", "was distressed without seeking comfort from parents", "was scared and wary and did not calm down despite the parent comforting or soothing him/her", "withdrew from contact", or "seemed to be apathetic and without hope". Respondents were asked to assess the severity and stability of each symptom on the scale where 0 = *not present*, 1 = *present to some degree*, 2 = *present to a great degree* and 3 = *still present*. Based on the severity and stability scores the symptoms were classified as follows: 1) no symptoms, 2) mild symptoms (at least one of the symptoms was reported to be present to some degree), and 3) severe symptoms (at least one of the symptoms was present to a great degree). The previous validation study (Elovainio et al., submitted) showed that the FinAdo RAD scale is a valid and reliable instrument for screening for symptoms suggesting RAD. The scale is capable of separating the symptoms suggesting two subtypes of RAD with satisfactory psychometric properties (internal consistency, a good model fit of the data). Inhibited (the latter three items) and disinhibited (the first three items) RAD scales were associated with an increased risk of emotional and behavioural problems and ADHD, indicating satisfactory criterion validity.

Statistical analysis

Statistical analyses were conducted using SAS for Windows (version 9.2), with p-values below 0.05 considered to be statistically significant. All significance tests were two tailed. FTF values for adopted children and general population were compared using the t-test for independent samples.

The child's current age, age at adoption and parents' depressive symptoms were analysed as continuous variables. The other variables gender, continent of origin, placement before adoption, SES of the family, parental marital status, child's developmental delay and child's symptoms of RAD were studied as categorical variables. The associations between language difficulties and the child's RAD symptoms were studied separately in both severity-based subclasses of language difficulties with the demarcation line on either the 90th percentile or the 98th percentile. Univariate associations were studied with all the variables. The multivariate analyses were conducted in four steps in order to examine the independent associations between RAD symptoms and language difficulties. First the child-related background factors (gender, age at evaluation, age at adoption, continent of origin, and type and number of placements before adoption) were included in the same analysis as the RAD symptoms. In the second model, the familial background factors (SES, parents' depressive symptoms, parental marital status), and in the third model the developmental delays were studied in the same model as RAD symptoms. In the final model all the variables were included simultaneously. The analyses were performed using logistic regression analysis. The results for the comparisons are given as odds ratios (*OR*) with 95% confidence intervals (95% CI). Logistic regression was also used to test the potential interaction effects between age at evaluation and RAD symptoms or SES and RAD symptoms on language problems.

The associations between RAD symptoms and the subdomains of language difficulties (comprehension, expressive language skills and communication) were studied as described above. The scores defining the 90th and 98th demarcation lines were calculated using the mean score and standard deviation of the general population. The figures for the 98th demarcation line were not considered to be reliable because the number of children scoring over that line was too small, thus the analyses for the subdomains were conducted with the demarcation line set at only the 90th percentile.

A sensitivity analysis was conducted in which we excluded the children whose language delay had been severe enough to be diagnosed ($n = 183$) in the public health services; this was in order to study the association between RAD symptoms and language difficulties in a typical population of internationally adopted children with no diagnosis of language disorders. In this analysis the demarcation line was set at the 90th percentile because the number of children scoring over the 98th percentile line ($n = 18$) was too small.

Because the evaluations of developmental delay may include language delay as well, we repeated the final steps in which developmental delay was excluded, using them as additional sensitivity analyses to test for any over-adjustment.

Results

The characteristics of the study sample are shown in Table 1. According to the parental questionnaire 29% (200/689) of the internationally adopted children had language problems and 8% (53/689) had severe language problems as compared with 10% and 2%, respectively, in the general population. The adopted children had higher problem scores indicating greater difficulty in all areas measured in the present study – comprehension 24% vs. 10% (162/689), expressive language skills 24% vs. 10% (168/689), and communication 27% vs. 10% (187/689)—than their peers (Table 2).

Table 1
Characteristics of the sample presented as mean (standard deviation) or number (percentage of the sample).

Characteristic	Mean (*SD*)	*n* (%)
Age at evaluation, years	9.4 (2.8)	
Age at arrival in Finland, years	2.6 (2.1)	
Gender, girls/boys		350 (50.8)/339 (49.2)
Continent of birth		
Asia		321 (46.7)
Eastern Europe		175 (25.4)
America		111 (16.1)
Africa		81 (11.8)
Number and type of the placements before adoption		
Foster home		53 (7.7)
Orphanage		387 (56.3)
Many placements		248 (36.1)
Developmental delay		44 (6.5)
Mild RAD symptoms	0.24 (0.32)[a]	268 (39.1)
Severe RAD symptoms		123 (18.0)
Disinhibited behaviour	0.45 (0.46)[a]	
Inhibited symptoms	0.14 (0.27)[a]	
Language difficulties		200 (29.0)
Severe language difficulties		53 (7.7)
Family's socioeconomic status		
Upper middle class		402 (59.6)
Lower middle class		138 (20.4)
Working class		117 (17.3)
Other		18 (2.7)
Single-parent household		103 (15.2)

Note.
[a] For all six items, in the mean score calculations 0 = *not present*, 1 = *present to some degree*, 2 = *present to a great degree*.
[b] In the mean score calculations 0 = not present, 1 = present to some degree, 2 = present to a great degree.

Associations between background factors and language difficulties

The univariate associations between background variables and language difficulties are shown in Table 3. The child's older age at adoption, Eastern European country of origin, and developmental delay were associated with language difficulties and severe language difficulties. The child's male gender was associated with a less severe subclass of language difficulties. In the multivariate analysis in which all the variables were included in the same model only the associations between less severe language difficulties and the child's older age at adoption, *OR* 1.18, 95% CI [1.07, 1.31] and the child's developmental delay *OR* 5.91, 95% CI [2.72, 12.86] remained statistically significant. Regarding severe language difficulties, the association with developmental delays was robust to adjustments for all other variables, *OR* 5.70, 95% CI [2.44,

Table 2
Results for the subdomains of the language section of the FTF questionnaire presented as mean problem scores, standard deviations (*SD*) in the different age groups and probabilities for the difference in mean scores between the groups of children who have been internationally adopted and the general population.

		Adopted children[a]		General population[b]			
Subdomains	Age (years)	*n*	Mean (*SD*)	*n*	Mean (*SD*)	*p*[c]	Cohen's *d*
Comprehension	6–8	320	0.34 (0.46)	243	0.21 (0.34)	.002	0.32
	9–12	249	0.43 (0.51)	384	0.16 (0.36)	<.001	0.64
	13–15	120	0.47 (0.57)	212	0.12 (0.24)	<.001	0.89
Expressive lang.	6–8	319	0.20 (0.29)	243	0.09 (0.15)	<.001	0.46
	9–12	249	0.22 (0.32)	384	0.08 (0.19)	<.001	0.56
	13–15	120	0.20 (0.30)	212	0.09 (0.20)	<.001	0.46
Communication	6–8	320	0.34 (0.46)	243	0.17 (0.32)	<.001	0.42
	9–12	249	0.38 (0.50)	384	0.16 (0.35)	<.001	0.53
	13–15	120	0.33 (0.51)	212	0.11 (0.27)	<.001	0.59

Note. Expressive lang. = Expressive language skills.
[a] FinAdo study, 2007. [b] Korkman et al., 2004. [c] For the difference.

Table 3
Univariate associations between variables and language difficulties.

	Language difficulties			Severe language difficulties		
	OR	95% CI	*p*	*OR*	95% CI	*p*
Gender (boy vs. girl)	1.85	[1.32, 2.58]	<.001	1.63	[0.92, 2.89]	.09
Age at evaluation (+1 year)	1.03	[0.98, 1.10]	.26	1.08	[0.98, 1.19]	.14
Age at adoption (+1 year)	1.28	[1.18, 1.38]	<.001	1.31	[1.17, 1.47]	<.001
Continent of origin						
–Africa vs. Asia	1.18	[0.67, 2.08]	.58	0.79	[0.14, 2.87]	.98
–Latin America vs. Asia	1.33	[0.81, 2.18]	.26	1.80	[0.67, 4.54]	.26
–Eastern Europe vs. Asia	3.02	[2.03, 4.50]	<.001	3.55	[1.75, 7.44]	<.001
Placement before adoption						
–Orphanage vs. foster home	0.59	[0.32, 1.08]	.09	0.52	[0.19, 1.46]	.22
–Several placements vs. foster home	0.92	[0.49, 1.70]	.78	1.22	[0.45, 3.33]	.70
Developmental delay vs. no delay	10.09	[4.88, 20.89]	<.001	8.81	[4.33, 17.93]	<.001
Family's socioeconomic status						
–Lower middle class vs. upper middle class	0.82	[0.53, 1.27]	.37	0.51	[0.21, 1.24]	.14
–Working class vs. upper middle class	1.30	[0.84, 2.01]	.24	1.16	[0.57, 2.37]	.68
–Other vs. upper middle class	0.93	[0.32, 2.66]	.89	1.40	[0.31, 6.34]	.66
Father's depressive symptoms	1.08	[1.00, 1.18]	.06	1.10	[0.97, 1.25]	.15
Mother's depressive symptoms	1.05	[0.97, 1.12]	.22	1.04	[0.92, 1.17]	.58
Two parents vs. single parent	0.99	[0.62, 1.56]	.95	0.44	[0.16, 1.26]	.13

13.35]. In addition, the final model showed that children living in a single-parent household had a lower incidence of severe language problems, *OR* 0.23, 95% CI [0.06, 0.87] although there was no significant association in the univariate analysis.

The univariate associations between subdomains of language problems and background factors are shown in Table 4. The child's male gender, older age at assessment, older age at adoption, Latin American or Eastern European background, father's depressive symptoms and child's developmental delay were associated with poorer comprehension skills. Male gender, older age at adoption, Eastern European background and child's developmental delay were associated with poorer communication skills and male gender, older age at adoption, Eastern European background or and developmental delay with poorer expressive language skills. In the multivariate analysis in the final model the mother's depressive symptoms, *OR* 1.13, 95% CI [1.03, 1.24] and the child's developmental delay, *OR* 7.08, 95% CI [3.33, 15.08] were associated with difficulties in communication, and the child's Latin American, *OR* 2.08, 95% CI [1.13, 3.85] or Eastern European, *OR* 1.96, 95% CI [1.14, 3.36] background, father's depressive symptoms, *OR* 1.13, 95% CI [1.02, 1.25] and the child's developmental delay, *OR* 6.17, 95% CI [2.96, 12.90] with comprehension problems. The child's older age at adoption, *OR* 1.25, 95% CI [1.12, 1.39], younger age at evaluation, *OR* 0.87, 95% CI [0.81, 0.95] and developmental delay, *OR* 3.95, 95% CI [1.95, 8.00] were associated with difficulties in expressive language skills.

Associations between RAD symptoms and language difficulties

The associations between RAD symptoms and language difficulties are shown in Table 5. The child's RAD symptoms were associated both with language difficulties and with severe language difficulties and the associations were robust to adjustments for all other variables. Familial SES or the child's age at evaluation had no significant interaction effects on the association between RAD symptoms and language difficulties ($p = .45$ for the familial SES and $p = .17$ for the child's age at evaluation) or between RAD symptoms and severe language difficulties ($p = .58$ and $p = .18$, respectively). The associations between RAD symptoms and subdomains of less severe language difficulties are shown in Table 6. All the subdomains measured in the present study were associated with RAD symptoms at the time of adoption.

Results of the sensitivity analyses

In the additional analysis, children with diagnosed language delay were excluded. Older age at evaluation, *OR* 1.11, 95% CI [1.03, 1.20], older age at adoption, *OR* 1.32, 95% CI [1.20, 1.45], Eastern European

Table 4
Univariate associations between background factors and subdomains of language difficulties.

	Comprehension			Expressive language skills			Communication		
	OR	95% CI	*p*	*OR*	95% CI	*p*	*OR*	95% CI	*p*
Gender (boy vs. girl)	1.76	[1.23, 2.51]	.002	1.69	[1.19, 2.40]	.004	1.76	[1.25, 2.47]	.001
Age at evaluation (+1 year)	1.11	[1.04, 1.18]	.002	0.95	[0.89, 1.02]	.14	0.99	[0.93, 1.05]	.69
Age at adoption (+1 year)	1.24	[1.15, 1.35]	<.001	1.26	[1.17, 1.37]	<.001	1.19	[1.10, 1.29]	<.001
Continent of origin									
–Africa vs. Asia	1.37	[0.73, 2.56]	.33	1.02	[0.56, 1.89]	.94	1.02	[0.58, 1.82]	.94
–Latin America vs. Asia	1.87	[1.11, 3.17]	.02	1.13	[0.67, 1.92]	.65	0.97	[0.58, 1.63]	.91
–Eastern Europe vs. Asia	3.61	[2.35, 5.55]	<.001	2.42	[1.60, 3.65]	<.001	2.12	[1.42, 3.16]	.002
Placement before adoption									
–Orphanage vs. foster home	0.67	[0.35, 1.28]	.28	0.66	[0.35, 1.26]	.21	0.95	[0.49, 1.85]	.87
–Several placements vs. foster home	0.92	[0.47, 1.78]	.80	1.06	[0.55, 2.05]	.86	1.52	[0.77, 3.00]	.23
–Developmental delay vs. no delay	9.75	[4.96, 19.18]	<.001	5.82	[3.08, 11.00]	<.001	9.70	[4.79, 19.67]	<.001
Family's socioeconomic status									
–Lower middle class vs. upper middle class	0.85	[0.54, 1.35]	.49	0.68	[0.42, 1.11]	.13	0.93	[0.60, 1.43]	.73
–Working class vs. upper middle class	0.87	[0.54, 1.43]	.59	1.47	[0.94, 2.31]	.09	1.03	[0.65, 1.63]	.90
–Other vs. upper middle class	1.53	[0.56, 4.19]	.41	1.18	[0.41, 3.38]	.76	1.31	[0.48, 3.58]	.60
Father's depressive symptoms	1.14	[1.05, 1.23]	.001	1.04	[0.96, 1.13]	.30	1.00	[0.92, 1.08]	.93
Mother's depressive symptoms	1.07	[0.99, 1.15]	.09	1.05	[0.97, 1.13]	.22	1.06	[0.99, 1.14]	.10
Single parent vs. two parents	0.97	[0.59, 1.59]	.90	0.80	[0.48, 1.33]	.39	0.73	[0.44, 1.19]	.21

Table 5
Univariate and multivariate associations between RAD symptoms and language difficulties.

	Language difficulties			Severe language difficulties		
	OR	95% CI	*p*	*OR*	95% CI	*p*
Univariate associations						
Mild RAD symptoms	2.64	[1.78, 3.91]	<.001	5.60	[2.28, 13.75]	<.001
Severe RAD symptoms	4.08	[2.56, 6.51]		8.77	[3.41, 22.56]	
Model 1[a]						
Mild RAD symptoms	2.23	[1.47, 3.38]	.002	4.72	[1.88, 11.82]	<.001
Severe RAD symptoms	3.07	[1.86, 5.06]	<.001	6.30	[2.34, 16.92]	<.001
Model 2[b]						
Mild RAD symptoms	2.62	[1.76, 3.91]	<.001	5.36	[2.17, 13.26]	<.001
Severe RAD symptoms	4.08	[2.54, 6.54]	<.001	8.95	[3.45, 23.20]	<.001
Model 3[c]						
Mild RAD symptoms	2.54	[1.68, 3.83]	<.001	5.54	[2.08, 14.77]	<.001
Severe RAD symptoms	3.40	[2.06, 5.60]	<.001	7.31	[2.58, 20.78]	<.001
Model 4[d]						
Mild RAD symptoms	2.15	[1.39, 3.31]	<.001	4.33	1.57-11.98	.004
Severe RAD symptoms	2.82	[1.66, 4.81]	.001	6.23	2.08-18.67	.001

[a] Adjusted for child's gender, age at evaluation, age at adoption, continent of origin, and type and number of placements. [b] Adjusted for family's socioeconomic status, parents' depressive symptoms and parents' marital status. [c] Adjusted for child's developmental delays. [d] Adjusted for child's gender, age at evaluation, age at adoption, continent of origin, type and number of placements, family's socioeconomic status, parents' depressive symptoms, parental marital status, and child's developmental delays.

origin, *OR* 2.76, 95% CI [1.63, 4.67] and developmental delay, *OR* 4.83, 95% CI [1.82, 12.87] were associated with language difficulties. In the multivariate analysis only the child's age at adoption was robust to adjustments, *OR* 1.27, 95% CI [1.12–1.43]. Both mild and severe RAD symptoms were associated with language difficulties in the univariate analysis *OR* 2.23, 95% CI [1.34, 3.72] and *OR* 3.50, 95% CI [1.92, 6.38], respectively. In the final model of the multivariate analysis the associations were robust to other factors, *OR* 1.94, 95% CI [1.12, 3.37] for mild RAD symptoms and *OR* 3.19, 95% CI [1.64, 6.22] for severe RAD symptoms.

In the other sensitivity analysis in which developmental delay was excluded from the final steps, the association between symptoms of RAD and language difficulties was robust to adjustments with other factors. There were associations between RAD symptoms and language difficulties, *OR* 2.17, 95% CI [1.43, 3.30] with mild RAD symptoms and *OR* 3.04, 95% CI [1.83, 5.04] with severe RAD symptoms as well as RAD symptoms and severe language difficulties, *OR* 4.36, 95% CI [1.73, 11.02] with mild RAD symptoms and *OR* 6.55, 95% CI [2.40, 17.88] with severe RAD symptoms.

In addition, it is possible that there are other familial factors such as number of siblings which may also affect language learning. In this study the number of siblings did not have a univariate association with language difficulties, $p = .53$ with less severe difficulties and $p = .68$ with the severe language difficulties. Thus the number of sibling does not appear to modify the association between RAD symptoms and language difficulties.

Discussion

This large sample study showed that, as evaluated by the parents, the children who had been internationally adopted had almost three times more language difficulties and four times more severe language difficulties than their peers. The difficulties were evident in comprehension, expressive language skills and communication. Those children who suffered from RAD symptoms at the time of adoption had more language difficulties than others. This association was robust to adjustments for all other variables measured, such as gender, age at evaluation, age at adoption, continent of origin, type and number of placements before adoption, family's SES, parents' depressive symptoms, parental marital status and developmental delays. In addition, the association was evident in both severity-based language problem subclasses and in comprehension, expressive language skills and communication.

Previous studies have indicated that despite their delayed language skills at the time of adoption, adopted children are able to gain good language skills after placement into a home environment (Neiss & Rowe, 2000). The factors influencing this recovery are still being studied. Our finding showed that the child's RAD symptoms at the time of adoption play a role in the child's poor language outcome for several years afterwards. There may be several reasons for this seeming discrepancy. First, symptoms of attachment disturbances and poor language skills may at least partly have the same antecedents in the deprivative preadoption environment (ICD-10; Beckett et al., 2006; Loman et al., 2009). The neural connections with respect to a child's relational behaviour and language learning may be organised in temporally limited sensitive periods in the first years of life (Sharma & Campbell, 2011; Sullivan & Holman, 2010) and this may have long-term effects years afterwards. However, in our multivariate analysis the association was robust to adjustments with the child's background factors, including those associated with deprivation such as number and type of placements before adoption and age at adoption. These results support the hypothesis that, in addition to potential common antecedents, there may also be other factors explaining this association.

Second, earlier studies have indicated the crucial role of social reciprocity in a child's language development (Fromkin et al., 1974; Kuhl, 2010; Kuhl et al., 2003). A recent hypothesis by Kuhl (2007, 2010) has suggested that in the complex process of language learning infants need to combine a set of skills with their social skills. While

Table 6
Associations between RAD symptoms and subdomains of language problems. presented as odds ratios (OR) and 95% confidence intervals (CI).

	Comprehension			Expressive language skills			Communication		
	OR	CI (95%)	*p*	*OR*	CI (95%)	*p*	*OR*	CI (95%)	*p*
Univariate associations									
Mild RAD symptoms	2.54	[1.65, 3.91]	<.001	2.25	[1.50, 3.40]	<.001	2.95	[1.96, 4.45]	<.001
Severe RAD symptoms	4.19	[2.55, 6.86]	<.001	2.94	[1.80, 4.78]	<.001	4.57	[2.82, 7.39]	<.001
Model 1[a]									
Mild RAD symptoms	2.38	[1.51, 3.74]	<.001	1.88	[1.22, 2.89]	.004	2.48	[1.62, 3.80]	<.001
Severe RAD symptoms	3.46	[2.03, 5.90]	<.001	2.09	[1.24, 3.53]	.006	3.57	[2.16, 5.92]	<.001
Model 2[b]									
Mild RAD symptoms	2.51	[1.62, 3.89]	<.001	2.21	[1.46, 3.35]	<.001	2.91	[1.92, 4.42]	<.001
Severe RAD symptoms	4.15	[2.51, 6.87]	<.001	2.93	[1.79, 4.79]	<.001	4.72	[2.90, 7.70]	<.001
Model 3[c]									
Mild RAD symptoms	2.36	[1.51, 3.70]	<.001	2.21	[1.45, 3.38]	<.001	2.79	[1.82, 4.27]	<.001
Severe RAD symptoms	3.20	[1.88, 5.44]	<.001	2.45	[1.46, 4.12]	<.001	3.88	[2.33, 6.46]	<.001
Model 4[d]									
Mild RAD symptoms	2.21	[1.37, 3.56]	.001	1.80	[1.15, 2.83]	.01	2.38	[1.52, 3.73]	<.001
Severe RAD symptoms	2.92	[1.64, 5.19]	<.001	1.93	[1.10, 3.37]	.02	3.41	[1.98, 5.87]	<.001

[a] Adjusted for age at evaluation, gender, continent of origin, age at adoption and placement before adoption. [b] Adjusted for family's socioeconomic status, parents' depressive symptoms and parental marital status. [c] Adjusted for child's developmental delay. [d] Adjusted for age at evaluation, gender, continent of origin, age at adoption, placement before adoption, family's socioeconomic status, parents' depressive symptoms, parental marital status and child's developmental delay.

the underlying brain systems mutually influence one another during development, the brain structures associated with social development might even 'gate' the mechanisms underlying language learning (Kuhl, 2007, 2010). According to this theory, the symptoms of RAD as a disorder of social reciprocity might harm a child's ability to gain a new language in interaction with adoptive parents. This hypothesis may be supported by our results, in which neither the child's background factors nor the familial factors removed the association between language difficulties and symptoms of RAD. The recent findings in the Bucharest Early Intervention Study among children from Romania indicated that signs of inhibited RAD diminished markedly during an average of eight months in foster care with special support, whereas the reduction in signs of indiscriminate behaviour was less straightforward (Smyke et al., 2012). In our study we are unable to evaluate the effect of the persistence of symptoms. However, in our study the majority of the children's RAD symptoms were of the indiscriminate variety, which has been shown to be quite persistent in earlier studies (Chisholm, 1998; Smyke et al., 2012).

Third, the learning processes, including language learning process, require an ability to focus. In early reciprocal interactions the effects of infant-directed speech may be partly due to the ability of this kind of speech to attract the child's attention towards social communication (Zangl & Mills, 2007). In recent studies, the indiscriminate subtype of RAD, in particular, has been associated with neurodevelopmental deficits such as impulsiveness and/or poor executive functioning (Gleason et al., 2011). A child's difficulties in focusing attention may also have an explanatory role in our findings, but this cannot be evaluated here.

Fourth, a recent longitudinal study among internationally adopted children in French-speaking families found an association between the age at which adopted children produced their first words in French and their subsequent language outcomes. According to this study children who produce their first words shortly after adoption may have better language skills later (Gauthier & Genesee, 2011). The difficulties in social reciprocity shortly after adoption, manifesting as symptoms of RAD, may delay the ability to gain especially the first words in a new language. Thus, delay in learning first words in a new language may as well have a role in explaining the association between RAD symptoms and later language difficulties.

In our study, male gender was associated with language difficulties, but the association was also explained by other factors. In studies among children who are not adopted there are early differences in language acquisition favouring girls, but this difference gradually disappears with age (Wallentin, 2009). Regarding the child's age when the parents reported their evaluations, a recent meta-analysis suggests that the language difficulties of children who have been internationally adopted become more evident at school age than in toddlerhood (Scott et al., 2011). The increase of language difficulties at older ages is thought to be the result of the increasing demands of the use of skilful academic language at a higher cognitive level necessary for school-age language tasks (e.g., Dalen, 2001, 2007). We found that the child's older age at parental evaluation was associated with difficulties in comprehension in our univariate analysis, but the association attenuated in the multivariate analysis, indicating that there are also other explanatory factors. The child's younger age at parental evaluation associated with difficulties in expressive language skills in our multivariate analysis after adjustment with other factors. This finding may be related to Finnish language and its complicated grammar.

Previous research has indicated that the child's older age at adoption predicts language difficulties (Croft et al., 2007; Scott et al., 2011). Our study yielded similar results, and the association with less severe problems was robust in a multivariate analysis. Interestingly, neither the child's RAD symptoms nor developmental delays explained this weak association, indicating that there must also be some other factor explaining the negative effect of late adoption age on language development. There are indications of deterioration of language learning as learners become increasingly mature suggesting the existence of a critical or sensitive period for the acquisition of language (Johnson & Newport, 1989). The child's total change of linguistic environment after a certain sensitivity period may complicate the capacity to learn a new language (Sharma & Campbell, 2011).

The child's Eastern European background was associated with both language difficulties and severe language difficulties in the univariate analysis, but the association was also explained by other factors. Children adopted from Eastern Europe are known to have specific kinds of developmental delays, including language difficulties (Landgren et al., 2006). An Eastern European background was also associated with problems in comprehension, communication and expressive language skills, but only the association with the subdomain comprehension was robust to adjustments. The overrepresentation of fetal alcohol exposure among children adopted from Eastern Europe (Landgren et al., 2006) and its impairment of the child's comprehension skills (Rasmussen et al., 2012) may play a role in this association. In our study the robust association between a child's minor developmental delays and language difficulties in both severity-based subclasses may be explained by the correlations between the language and cognitive measures.

Among children who have not been adopted, familial factors such as SES and maternal distress have been shown to have an impact on the child's language development (Hackman et al., 2010; Schjølberg, Eadie, Zachrisson, Oyen, & Prior, 2011). The influence of parental SES on the child's language development is thought to be partly explained by the effects of prenatal factors, parent–child interactions and cognitive stimulation on the child's brain development (Hackman et al., 2010). In our study, among adopted children neither familial SES nor any other familial factor of the child's adoptive family was associated independently with the less severe language difficulties. This may have been due to the narrow range of socioeconomic differences among adoption families. Maternal depressive symptoms were associated with the child's difficulties in the subdomain communication, whereas paternal depressive symptoms were associated with comprehension. Parental depressive symptoms during infancy have been shown to be connected with a child's language difficulties (Paulson, Keefe, & Leiferman, 2009; Quevedo et al., 2012) but their effects on adopted children's language development is not clear. The causality of our findings cannot be evaluated here; the child's language problems may have caused the parental depressive symptoms as well as vice versa. However, together with the findings concerning symptoms of RAD, the lack of consistent associations with familial factors underlines the long-term effect of the child's adverse experiences in the first years of life on his/her later development.

Limitations

The response rate (55.7%) is relatively low for estimating prevalence numbers. Although the main finding—the association between symptoms of RAD and language difficulties—is not quite as dependent on the response rate, the association reported here may be an under- or overestimation of the true association. However, neither the non-respondents' gender nor their country of origin differed from those of the respondents. Furthermore, language difficulties and the child's symptoms suggesting RAD were evaluated by parental screening of the symptoms instead of using individual diagnostic procedures or assessments, which is a major limitation of the study. The parent reporting method made the research feasible in this large sample. Regarding the symptoms of RAD, the parents can be considered the best informants because attachment disturbances can best be perceived in the closest relationships (AACAP, Boris et al., 2005). It is part of Finnish adoption policy to provide intending parents with plenty of information about attachment issues before they are allowed to adopt a child. However, further research using behavioural measures is recommended to validate these findings. In this study we were not able to take into account the language spoken in the child's preadoption institutions/homes due to the number of countries and languages of origin. Instead, the child's continent of

origin was included in the analysis although the language spoken may actually be even more important. Because Finnish is recognised as a difficult language to learn, this may have affected the prevalence of language difficulties and should be taken into account when generalizing the findings. However, most of the children in this study come from countries where the language bears no resemblance to Finnish, and this may increase the reliability of the comparisons.

Implications for interventions

This study has shown that internationally adopted children have more language difficulties than their peers and that their symptoms of RAD at the time of adoption are associated with language difficulties at school-age. This finding may have important clinical implications regarding intervention strategies. A child's attachment status should be evaluated, especially among those children who have language difficulties. The signs of at least the inhibited type of RAD have been shown to diminish among children from Romania after the child's placement into a foster home with a supportive intervention (Smyke et al., 2012). Although the children from Romania had suffered extreme deprivation before adoption, these findings suggest it would be beneficial to offer adoptive families support focusing, in particular, on reducing the incidence of attachment disorders. In addition, any simultaneous need for attachment support should be taken into account in the speech therapies provided for children who have been internationally adopted. Therapies provided in the presence of the adoptive parents should be considered so that the role of the parent as primary caregiver can be reinforced. The permanence of therapists as well as teachers might be helpful for these children. On the other hand, difficulties with language may affect a child's behaviour, including attachment behaviour. Thus, these children may benefit from the use of visualization, such as pictures or drawings in order to help communication in their everyday life as well as in attachment-based therapies.

Conclusions

The findings in this study indicated that language difficulties are highly prevalent among internationally adopted children and the difficulties were evident in comprehension, expressive language skills and communication. Difficulties in a child's social reciprocity may be among the factors increasing the risk of language problems. Both RAD symptoms and language difficulties should be noticed in intervention strategies.

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