



## Attachment Disturbances Delay Language Acquisition in Internationally Adopted Children

Rachel M. Jensen, Emily J. Helder & Marjorie Lindner Gunnoe

To cite this article: Rachel M. Jensen, Emily J. Helder & Marjorie Lindner Gunnoe (2016) Attachment Disturbances Delay Language Acquisition in Internationally Adopted Children, *Adoption Quarterly*, 19:3, 210-223, DOI: [10.1080/10926755.2016.1201709](https://doi.org/10.1080/10926755.2016.1201709)

To link to this article: <https://doi.org/10.1080/10926755.2016.1201709>



Accepted author version posted online: 28 Jun 2016.  
Published online: 29 Jul 2016.

---



Submit your article to this journal [↗](#)

---



Article views: 498

---



View Crossmark data [↗](#)

---

## Attachment Disturbances Delay Language Acquisition in Internationally Adopted Children

Rachel M. Jensen<sup>a</sup>, Emily J. Helder<sup>b</sup>, and Marjorie Lindner Gunnoe<sup>b</sup>

<sup>a</sup>Pine Rest Christian Mental Health Services, Grand Rapids, Michigan, USA; <sup>b</sup>Calvin College, Grand Rapids, Michigan, USA

### ABSTRACT

Cross-sectional research on internationally adopted children has indicated an association between early attachment disturbances and language deficits. Raaska et al. (2013) have speculated that this relationship is likely bidirectional. In an attempt to elucidate the causal relationship between these two risk factors, the attachment disturbances and language skills of 44 internationally adopted children were assessed in a cross-lagged structural equation model. Greater attachment disturbances at wave 1 predicted less gain in language by wave 2. In contrast, language at wave 1 was not predictive of attachment disturbances at wave 2. These results suggest that early attachment problems may present an important risk for later language development and should be an immediate and primary focus of post-adoptive intervention for families adopting internationally.

### ARTICLE HISTORY

Received 17 August 2015  
Revised 21 April 2016  
Accepted 25 April 2016

### KEYWORDS

Attachment; language; development; international adoption; longitudinal

In the ten years between 2003 and 2012, approximately 166,000 children were adopted into the United States from other countries (U.S. State Department, 2014). These children have been shown across several studies to be at increased risk for delayed development in multiple domains, including cognitive functioning, language, motor skills, social abilities, and attachment to caregivers (van den Dries, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2009; Weitzman & Albers, 2005). Studies also show higher rates of service usage in these children across several categories (physical health, behavior, academic, mental health, speech, parenting, and relationships), compared with children living in biologically related families (Castle et al., 2006; Le Mare, Audet, & Kurytnik, 2007).

Longitudinal investigations indicate that many of the difficulties experienced by internationally adopted children persist across time. For example, long-term studies of children adopted from Romania into the United Kingdom have shown persistence of disinhibited attachment (DA) patterns for a significant number of participants from age 6 through adolescence (Kreppner et al., 2010). Similarly, a

recent meta-analysis of language acquisition in children adopted internationally found that, as a group, these children were more likely to have slightly but significantly poorer language skills than comparison children (Scott, Roberts, & Glennen, 2011). In addition, several studies have shown intercorrelation among problem areas across development, including correlations between cognitive functioning, behavior problems, attention problems, and attachment concerns (Abrines et al., 2012; Chisholm, 1998; Kumsta et al., 2010).

In reviewing studies of attachment in children adopted internationally, it is important to note that controversy remains in the literature as to whether disinhibited social behaviors commonly observed in internationally adopted children in fact signal disturbed attachment (Kumsta et al., 2010) or whether these behaviors are instead simply another expression of poor overall inhibition (Bruce, Tarullo, & Gunnar, 2009). In a recent update from a longitudinal study, the English and Romanian Adoptees (ERA) Study Team investigated DA in 15-year-olds previously adopted to England from Romania. They defined the core behavioral features of DA as an “inappropriate approach to unfamiliar adults, a lack of wariness of strangers, a failure to check back with a caregiver in unfamiliar settings, and willingness to accompany a stranger and wander away from a familiar caregiver ... often associated with a lack of appropriate physical boundaries” (Kumsta et al., 2010, p. 58). For adolescents who experienced early severe deprivation that lasted beyond 6 months of age, persistence of DA was found through 15 years of age (Kreppner et al., 2010; Kumsta et al., 2010). In contrast, Bruce et al. (2009) distinguished disinhibited social behavior from attachment behavior. These investigators examined children adopted internationally from both institutions and foster care, in comparison with children raised by their biological families. Results indicated that both groups of international adoptees showed increased disinhibited social behavior, and disinhibited social behavior was found to be associated with inhibitory control abilities. The authors suggested that disinhibited social behavior may reflect underlying inhibitory control deficits, as opposed to revealing disordered attachment (Bruce et al., 2009). In other words, if a child adopted internationally demonstrated a particular behavior, such as lack of wariness of strangers, one school of thought would see that behavior as a sign of disordered attachment (a social-relational problem), while the other school of thought would view the same behavior as an expression of weak inhibitory control (a cognitive-behavioral problem). While controversy remains regarding the most appropriate conceptualization of these behaviors, together these studies suggest the persistence of attachment/behavior patterns across time.

With regard to language, international adoption presents a unique challenge for language development, distinct from those faced by monolingual or bilingual children, as exposure to the child's first language typically ceases at adoption, often prior to the child developing proficiency in the new language (Glennen, 2002; Glennen, 2009; Glennen & Masters, 2002; Hwa-Froelich & Matsuo, 2010; Scott et al., 2011). While the exceptional nature of this task has been recognized for

some time and several studies have addressed the need to better understand language development patterns for these children (Glennen & Masters, 2002; Glennen, Rosinsky-Grunhut, & Tracy, 2005; Scott, 2009; Scott, Pollock, Roberts & Krakow, 2013; Scott, Roberts, & Krakow, 2008; Windsor et al., 2011), information about typical versus atypical language development patterns for internationally adopted children remains limited (Glennen, 2002; Hwa-Froelich & Matsuo, 2010).

An earlier meta-analysis (van IJzendoorn, Juffer, & Poelhuis, 2005) did not find significant differences in intellectual functioning between adopted children and their non-adopted peers or siblings, but it did find delay in language development among adopted children. A more recent meta-analysis (Scott et al., 2011), which included several more studies published in the brief time since the earlier analysis, found that adopted children demonstrated significant variability in language skills. As a group, these children tend to follow a similar trajectory to biological children in mastering their new language (Glennen, Rosinsky-Grunhut, & Tracy, 2005), and many children adopted internationally catch up quickly to their peers with regard to language development (Glennen et al., 2005; Scott, 2009). However, a subgroup of these children show persistent language difficulties over time (Scott, 2009). Interpretation of these larger patterns is complicated by the need to consider several additional concerns, including (1) moderator variables such as age at adoption (Croft et al., 2007; Windsor et al., 2011), country of origin (Gauthier & Genesee, 2011), age at testing (Scott et al., 2011), length of exposure to the new language, pre-adoption experiences, and post-adoption experiences (Scott, 2009; Scott et al., 2008); (2) assessment type, whether survey or norm-referenced instruments (Scott et al., 2011); (3) type of language skills assessed, such as articulation, vocabulary, or expressive or receptive language (Gauthier & Genesee, 2011; Glennen, 2009); and (4) use of appropriate norm and control groups (Gauthier & Genesee, 2011; Hwa-Froelich & Matsuo, 2010).

Given the persistence and intercorrelation of commonly seen deficits in internationally adopted children, several authors have also examined the *interaction* of developmental domains, including relationships between attachment and language. For example, in a follow-up to an earlier study (Glennen & Masters, 2002), Glennen and Bright (2005) found that, on the basis of parent report, expressive vocabulary at 2 to 3 years of age predicted social skills and problem behaviors 5 years later (age 6 to 9 years). The field is also beginning to move toward investigating *why* these problems are related. One possibility is that a single variable generates multiple outcomes, such as deprivation producing both language and attachment problems. Another potential explanation is that there are causal relationships between outcome variables. In this scenario, language problems may exacerbate attachment concerns, attachment disturbances may exacerbate language difficulties, or reciprocal exacerbation may occur between attachment and language problems. Some of these possibilities have been proposed by Raaska et al. (2013). Their cross-sectional study found that children adopted internationally have significantly more language

problems than comparison children and that children exhibiting symptoms of reactive attachment disorder (RAD) at adoption had more language difficulties than others. The relationship between language problems and attachment disturbances remained even in the presence of adjustments for other variables (gender, age at evaluation, age at adoption, continent of origin, type and number of placements before adoption, family socioeconomic status, parent depressive symptoms, parental marital status, and developmental delays), suggesting a robust association between attachment and language. In view of this pattern, Raaska and colleagues have proposed a number of explanations for the relationship between language and attachment, beyond common underlying factors. First and foremost, they point to the critical role of social reciprocity in language development and suggest that disturbed attachment (which includes disordered social reciprocity) may have a negative effect on a child's language learning in the context of the parent-child relationship. The investigators also highlight recent findings demonstrating a relationship between indiscriminate RAD, impulsivity, and/or executive dysfunction, suggesting that poor attention regulation may also negatively influence language development. Finally, they review recent research underlining the importance of the timing of speaking first words in a new language and suggest that the social problems associated with RAD might delay this important milestone for children adopted internationally and thus negatively affect language development further.

The work of Raaska et al. (2013) revealed interesting patterns of interaction between language and attachment development in internationally adopted children. However, the study's design was cross-sectional and utilized retrospective reporting to assess attachment across time. In addition, the study used parental report to assess language functioning, rather than formal language assessment. Further research is needed, using longitudinal designs and direct assessment of language function.

The current study aims to examine connections between language and attachment in a sample of children adopted internationally. Given the connections between social engagement and language learning processes (Kuhl, 2007; Raaska et al., 2013), we hypothesized a bidirectional relationship between language and attachment after controlling for three of the most relevant demographic factors (length of deprivation, age at testing, and time in adoptive home). This hypothesis was tested in a two-wave structural equation model (SEM).

## **Method**

### ***Participants***

Participants were recruited through local adoption agencies and organizations providing services to adoptive families. Families interested in the study underwent phone screening to assess whether potential participants met the following criteria:

**Table 1.** Descriptive statistics for control variables.

	Mean	SD	Range
Length of time in orphanage (years)	2.75	3.11	<1 to 12
Length of time in adoptive home (years)	2.07	1.33	<1 to 5
Age at study onset (years)	7.45	3.52	3 to 16

(1) adopted internationally within the last 5 years, (2) younger than 18 years at the beginning of the study, (3) no indication of prenatal alcohol or drug exposure, according to parent and pediatrician report, and (4) no known medical condition that could influence the child's cognitive performance (e.g., epilepsy, history of head injury, genetic abnormalities).

Forty-nine children were identified and enrolled in the study, although five children had incomplete data during wave 1 and/or wave 2 and were not included in further analyses. The remaining 44 participants (13 boys, 31 girls) with complete data for both waves did not differ from the 5 who did not have complete data with regard to the demographic (time in orphanage, time in adoptive home, age at study onset) or focal variables at wave 1. Descriptive information on these demographic indicators are shown in Table 1. With respect to the correlations among potential control variables, neither age at adoption ( $r = 0.26, p > .05$ ) nor age at the beginning of the study ( $r = 0.14, p > .05$ ) was correlated with length of time in the adoptive home.

The children in the study were adopted into the United States from four world regions. Twenty-three were from Southeast Asia, nine from Northern Asia and Eastern Europe, eight from Africa, and four from Central and South America.

Of the 44 children in the study, 89% had spent some time in orphanage care ( $n = 39$ ). Children who had lived in an orphanage did so for a mean of 2.75 years ( $SD = 3.11$ ). Thirty-two percent of the children had lived in foster care at some point, with a mean of 2.15 years ( $SD = 2.41$ ). Fifty percent of the children had lived with their biological parents for some time, for a mean of 1.89 years ( $SD = 2.43$ ). Adoptive mothers had completed a mean of 16.3 years of education ( $SD = 1.97$ ), with a range from 12 to 20 years. Adoptive fathers had completed a mean of 16.61 years of education ( $SD = 2.11$ ), again with a range from 12 to 20 years.

### Procedure

This report is part of an ongoing longitudinal study in which most families have been assessed four times. Due to the low ratio of sample participants per SEM parameter of interest, only data from waves 1 and 2 were utilized in this report. At wave 1, children had been in their adoptive homes an average of 2.07 years ( $SD = 1.33$ ). The mean time from waves 1 to 2 was 11.61 months ( $SD = 1.54$ ).

For each assessment, children visited a college campus with one of their adoptive parents (43 mothers and 1 father). Following consent and assent procedures, appointments consisted of a semi-structured parent interview and a battery of

cognitive tests administered by a member of the research team. Appointments ranged from 2 to 3.5 hours in length, depending on the age of the child. No financial incentives were offered for participation.

The semi-structured interview at the wave 1 appointment gathered information regarding pre-adoptive care, age at adoption, adoptive family characteristics, developmental milestones, medical history, children's educational information, service use, and any concerns parents had regarding behavioral, emotional, and/or social functioning. The wave 2 parent interviews focused on the updating of information regarding developmental milestones, educational progress, medical history, service use, and parent concerns. Additionally, the Disturbances of Attachment Interview (DAI, Smyke & Zeanah, 1999) was administered at each interview. Yearly cognitive testing with participants included assessments of a wide variety of cognitive skills. For the current study, only language data were utilized.

## **Measures**

### **Language**

Expressive language functioning was assessed with performance on the Word Structure subtest of the CELF-IV (Semel, Wiig, & Secord, 2003) and CELF-P2 (Wiig, Secord, & Semel, 2004) or the Formulating Sentences subtest of the CELF-IV (Semel et al., 2003), depending on the age of the child. The Word Structure subtest, which has norms for children aged 3 to 8 years old, requires children to complete a sentence with a target word or phrase that accompanies a picture. For example, the child could be shown a picture of a single shoe and a pair of shoes and be asked to complete the sentence "Here is one shoe, here are two ...". The Formulated Sentences subtest, which has norms for individuals aged 5 to 21, presents a child with a picture scene and requires them to generate a sentence about the picture that uses a target word. For example, a picture of a library scene could be presented and the child would be asked to make a sentence using the word "book." It was necessary to utilize these two subtests because norms were not available for a single subtest of the CELF across the age range of the study participants. However, these two subtests have the highest reported intercorrelation among expressive language subtests on the CELF-IV within the standardization sample ( $r = .62$ , Semel et al., 2003). In the current study, 18 participants completed the Word Structure subtest at both waves, 15 participants completed the Formulating Sentences subtest at both waves, and the remaining 11 participants completed the Word Structure subtest at wave 1 and the Formulating Sentences subtest at wave 2. Within both waves, there was not a significant difference in expressive language score for participants who completed the Word Structure compared to participants who completed the Formulating Sentences.

In order to assess receptive language, the Concepts and Following Directions of the CELF-IV (Semel et al., 2003) and CELF-P2 (Wiig et al., 2004) or the Word Classes-Receptive subtest of the CELF-IV (Semel et al., 2003) were utilized, depending on the age of the child. The Concepts and Directions subtest, which has

**Table 2.** Descriptive statistics for focal variables.

	Wave 1		Wave 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Receptive Language	6.66	4.02	8.07	3.84
Expressive Language	6.02	4.30	7.30	4.53
Language Combined	6.42	3.97	7.68	3.83
Attachment Disturbances	4.23	3.21	3.43	3.91

norms for 3- to 12-year-olds, presents children with a set of pictures and asks them to point to specific pictures in a certain order. The Word Classes-Receptive subtest, which has norms for 5- to 21-year-olds, presents a set of three or four words and requires the child to identify two words that are related. For example, the child would be read “shirt, door, shoe, chair” and would identify that shirt and shoe are related. The Concepts and Following Directions subtest and Word Classes-Receptive subtest have the highest intercorrelation among receptive language subtests on the CELF-IV in the standardization sample ( $r = .48$ , Semel et al., 2003). In the current study, 40 participants completed the Concepts and Following Directions subtest at both waves, 3 completed the Word Classes-Receptive subtest at both waves, and 1 participant completed the Concepts and Following Directions subtest at wave 1 and the Word Classes-Receptive subtest at wave 2.

Age-standardized subtest scaled scores were calculated for each CELF-P2 or CELF-IV subtest ( $M = 10$ ,  $SD = 3$ ). The age-standardized scores on the two subtests were averaged to create a single language score. See Table 2 for mean performances across waves.

### **Attachment disturbances**

Attachment disturbances were assessed using the DAI (Smyke et al., 1999), a 13-item semi-structured interview that addresses a range of attachment-related behaviors relevant to internationally adopted populations. This includes questions addressing whether the child seeks comfort when distressed, is overly friendly with strangers, or displays hypervigilant attachment behaviors. For example, in order to assess overly friendly behavior, parents are asked “Does your child ever take unusual non-aggressive liberties with unfamiliar adults, such as climbing up in a lap, approaching to be picked up, or hugged?” Each item is rated by the interviewer on a scale of 0 to 2 based on parent response to interview probes, and a total score is formed by adding the ratings together for all items (possible range 0 to 26).

### **Analysis and results**

Table 2 shows the mean performance on the language measure (CELF-P2/CELF-IV) across waves, as well as mean attachment scores (DAI), with higher DAI scores indicating a greater disturbance in attachment relationships. Table 3 presents intercorrelations among control variables, language functioning, and attachment. Two of our

**Table 3.** Intercorrelations among control and focal variables.

Measure	2	3	4	5	6	7
1. Length of time in orphanage	-.15	.68***	.54***	.51***	-.47**	-.57***
2. Length of time in adoptive home		.19	-.05	-.08	.59***	.34*
3. Age at study onset			.44**	.36*	-.33*	-.49**
4. Wave 1 Attachment Disturbances				.68***	-.24	-.41**
5. Wave 2 Attachment Disturbances					-.19	-.39**
6. Wave 1 Language Functioning						.81***
7. Wave 2 Language Functioning						

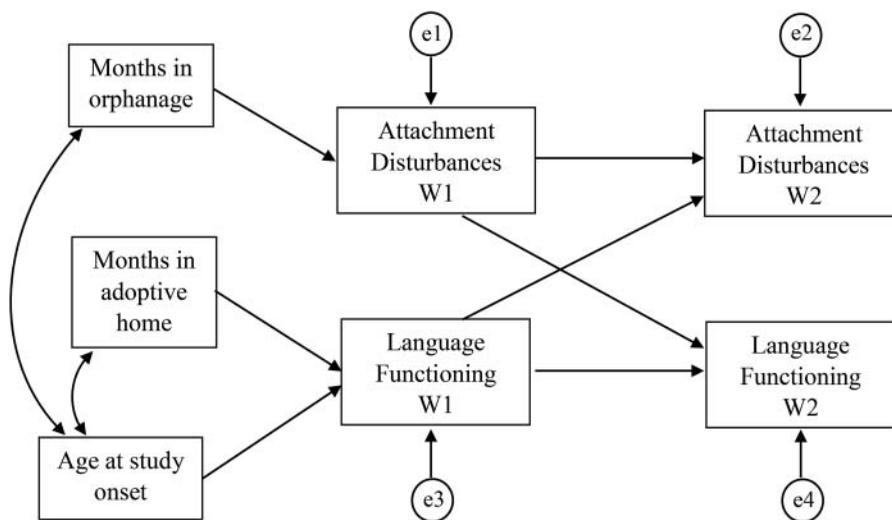
Note. \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ .

planned demographic controls, length of time in orphanage and age at study onset, were highly correlated ( $r = 0.68$ ). To ensure that all three of the planned demographic controls would explain unique variance in the model, we regressed the wave 1 focal variables onto the three demographic indicators. When the three variables were considered simultaneously, length of time in orphanage was the only variable to explain unique variance in attachment disturbances ( $\beta = .54$ ,  $p < .001$ ). The other two planned controls, length of time in adoptive home ( $\beta = .69$ ,  $p < .01$ ) and age at study onset ( $\beta = -.48$ ,  $p < .01$ ), both explained unique variance in language functioning. These preliminary analyses suggested the need for all three demographic controls in the model.

Longitudinal relationships between children's attachment disturbances and language functioning at waves 1 and 2 were explored using AMOS (Analysis of Moment Structures), a structural equation modeling program. In keeping with the bidirectional effect that we had hypothesized, we first tested a cross-lagged model in which attachment disturbances at wave 1 predicted language functioning at wave 2 and language functioning at wave 1 predicted attachment disturbances at wave 2 (see Figure 1).

In addition to the regression paths between the two focal constructs the first model included longitudinal relationships between the focal constructs and themselves (e.g., wave 1 language functioning to wave 2 language functioning), regression paths from the three demographic controls (length of time in orphanage, length of time in adoptive home, and age at study onset) to wave 1 focal variables, correlational paths between the demographic controls, and the necessary error terms associated with the focal variables. Although not shown in the figures, error terms within the same wave were also permitted to correlate. Such correlations capture the *within-wave* association between the focal constructs, ensuring that cross-lagged regression paths reflect only the *across-time* association of the focal constructs.

One of the challenges associated with SEM is that there is a disagreement among statisticians about how best to judge the "fit" of a model. We chose three commonly used indices: the model chi-square, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI). Both the chi-square and RMSEA are *absolute fit* indices that indicate how well a specified a priori model



**Figure 1.** Hypothesized model. Note: Error variances on the focal variables are permitted to correlate within waves.

fits the data (Hooper, Coughlan, & Mullen, 2008). The chi-square is the original and traditional measure for assessing model fit. Chi-square values with a *p* value greater than .05 are considered a good fit (i.e., the data and the proposed model are not significantly different). Although some researchers (e.g., Barrett, 2007) believe that the chi-square should be the only index interpreted, a review of SEM publications indicates that “virtually all papers” also report the RMSEA (Kenny, 2008, p. 6). The RMSEA indicates how well a model with optimal parameters would fit the population’s covariance matrix and has come to be regarded as one of the most informative indices due to its bias toward parsimony (i.e., the RMSEA will choose the model with the lesser number of parameters; Hooper et al., 2008). Lower RMSEAs are better than higher ones. Values less than .05 are generally considered to be indicative of a “good” fit; values higher than .07 (Hooper et al., 2008) or .08 (Kenny, 2008) have been deemed unacceptable. The third fit index employed in this research, the CFI, is an *incremental fit* index. Incremental fit indices compare the obtained chi-square value to a baseline model in which all variables are uncorrelated. The CFI is one of the most popularly reported incremental indices because it is relatively unaffected by a small sample size. CFIs range from 0 to 1, with values  $\geq .95$  currently recognized as indicating a good fit (Hooper et al., 2008).

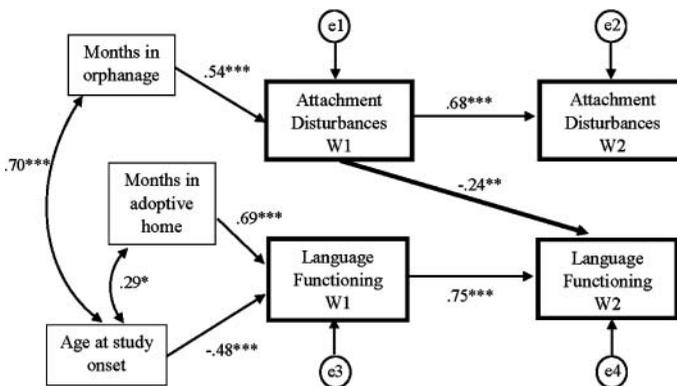
A second challenge associated with SEM is that the (required) estimation of error variances for each of the endogenous variables as well as the estimation of the associations between these error variances makes it difficult to maintain a desirable ratio of participants to parameters in studies based on small samples. A general rule of thumb is that researchers have at least five participants per estimated parameter but smaller ratios are often employed in exploratory research, particularly if the proposed model does not include latent variables (Kenny, 2014)

and several logically plausible models are tested (Bentler, 1995). To keep the ratio of participants-to-parameters as low as possible while still testing a theoretically meaningful model, only data from waves 1 and 2 were employed in this study.

Estimation of our first model indicated an acceptable fit according to two of our three fit indices ( $\chi^2(6) = 8.33, p = .22$ ; CFI = .99), but an RMSEA of .10 revealed that this model was not parsimonious (i.e., we had too many paths in the model). We then deleted all non-significant paths except the correlations between the within-wave error variances (required to force the partialling of cross-sectional vs. longitudinal association between the focal variables) and reran the model. The resultant model in which wave 1 attachment disturbances predicted wave 2 language functioning (bolded in Figure 2) but wave 1 language functioning did *not* predict wave 2 attachment disturbances yielded a very good fit per all three fit indices ( $\chi^2(11) = 10.84, p = .46$ ; RMSEA = .00; CFI = 1.0). Figure 2 provides standardized regression weights for each path in the model.

Because this model contained more than the recommended number of parameters for our sample size, we then estimated the alternative model most likely to help elucidate directionality between the focal constructs. As explained by Bentler (1995, p. 10) “*in small samples, it is imperative to test multiple models, some of which may be logically appropriate even though they may not be your favorite models. If some of the models are rejected, your N is probably large enough. That is, N should be large enough so that power exists to reject alternative models.*”

To enable a direct comparison between the model presented in Figure 2 and the most relevant alternative model, we held the total number of parameters in the models constant, varying only one parameter: the path from wave 1 attachment disturbances to wave 2 language functioning was *replaced* by a path from wave



Note: Error variances on the focal variables are permitted to correlate within waves.

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

$\chi^2(11) = 10.84, p = .457$

RMSEA = .000

CFI = 1.0

**Figure 2.** Final model. Note: Error variances on the focal variables are permitted to correlate within waves.  $\chi^2(11) = 10.84, p = .457$  \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$  RMSEA = .000 CFI = 1.0.

1 language functioning to wave 2 attachment disturbances. While this model yielded adequate chi-square and CFI values ( $\chi^2(11) = 17.11, p = .10; CFI = .96$ ), the RMSEA of .11 marked it as a model that must be rejected. In addition to establishing that our sample size is large enough to test these models, the rejection of the most likely alternative model increases the likelihood that it is attachment disturbances rather than language functioning that is “driving” the association between these two constructs in our sample.

## Discussion

This study was designed to investigate the relationship between language functioning and attachment disturbances in internationally adopted children. We hypothesized a bidirectional relationship between language and attachment, controlling for length of time in orphanage care, length of time in the adoptive home, and age at beginning of the study. Our findings did not support this hypothesis and instead revealed that attachment functioning predicted later language outcomes while the reverse (language predicting later attachment) was not found. These findings suggest that early problems in attachment present an immediate risk for language acquisition, even after controlling for length of deprivation, time in adoptive home, and age at study onset.

The importance of our findings lies in their elucidation of the temporal relationship between language and attachment for children who have been internationally adopted. Our results provide replication and extension of the recent work by Raaska et al. (2013), which showed an association between symptoms of RAD and language difficulties. Improving on the work of Raaska et al., which used retrospective parent report, we collected prospective longitudinal data, thus allowing for unique explication of the nature of the relationship between language and attachment for these children over time. Additionally, our results use direct assessment of language skills rather than relying on parent report, providing greater confidence in the relationship between language and attachment disturbances, given the use of multiple modes of assessment. Thus, this study offers important new insight into the timeline of development and pattern of recovery for this group of children at risk of adverse developmental outcomes. That is, children with evidence of attachment disturbances at wave 1 were more likely to have poorer language abilities at wave 2; in contrast, children with poorer language abilities at wave 1 did not necessarily have greater disturbances in attachment at wave 2.

In terms of limitations, our study relied on parent report of attachment behaviors and did not include observational measures of attachment, such as those used by other investigators (e.g., Bruce et al., 2009). Also, due to the nature of our participant's age range and the norms available for the language measure, expressive and receptive language was assessed using two subtests each. Ideally, future studies would be able to use the same exact language task across all participants. In addition, the current model was obtained using a relatively small sample size, thus

limiting the number of demographic controls and focal variables that could be assessed. Adding focal variables such as sustained attention to the model would have been helpful in testing some of the alternative explanations for the existence of the relationship between language and attachment suggested by Raaska et al. (2013). A further limitation of the current study is that it was not designed to tease apart DA from more traditional concepts of insecure attachment. As discussed earlier, controversy remains as to whether disinhibited social behavior in internationally adopted children is a reflection of disturbed attachment (Kumsta et al., 2010; Rutter, Kreppner, & Sonuga-Barke, 2009) or is simply another expression of poor overall inhibitory control abilities (Bruce et al., 2009). This will be an important issue to address in the designs of future studies. Also, our study does not use a control group, such as domestically adopted children, which would provide a control for second language acquisition. Future research examining the temporal associations of language and attachment using such a control group would provide stronger support for our findings. Finally, though we screened for fetal alcohol exposure through physician and parent report, it is possible that children were included in the sample who had been exposed to substances in utero but at a level that did not result in obvious physical malformations.

It is also important to note that participants were tested relatively soon after joining their adoptive family; thus, standardized assessment of their language functioning is limited by their recent exposure to English. However, given that the goal of the study was to examine the interplay of attachment and language in the immediate adjustment period after adoption, tests of language were used knowing that it would not be appropriate to use participants' scores to make firm predictions about clinical prognosis until children had been in their adoptive home for a longer period of time.

In spite of these limitations, the present study provides an important insight into how the parent-child relationship in international adoptions unfolds over time. With recent trends toward older age at adoption and high service utilization among families of international adoptees, better understanding of the developmental trajectories of these children and of the effectiveness of post-adoption services is becoming increasingly important (Barth, Crea, John, Thoburn, & Quinton, 2005; Glennen & Masters, 2002; Le Mare et al., 2007). In terms of clinical application, the current results underscore the importance of monitoring attachment development and screening for attachment concerns. While the majority of children adopted internationally form healthy attachments to their adoptive families (Van Londen, Juffer, & van IJzendoorn, 2007), children adopted internationally, particularly those adopted at later ages, are at increased risk for developmental concerns (van den Dries, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2009). For children who do exhibit attachment disturbances, the current results suggest that attachment-targeted interventions may also improve later language outcomes. Furthermore, current results suggest that traditional divisions between categories of development (e.g., social vs. cognitive) may not accurately reflect development in

children adopted internationally, for whom language and attachment development appear to be robustly intertwined. Continued research into the temporal connection between language acquisition and social relationship skills for these children can facilitate more informed prevention and intervention programs for a group of children at risk for adverse developmental outcomes.

## References

- Abrines, N., Barcons, N., Marre, D., Brun, C., Fornieles, A., & Fumadó, V. (2012). ADHD-like symptoms and attachment in internationally adopted children. *Attachment & Human Development, 14*(4), 405–423.
- Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences, 42*(5), 815–824.
- Barth, R. P., Crea, T. M., John, K., Thoburn, J., & Quinton, D. (2005). Beyond attachment theory and therapy: Towards sensitive and evidence-based interventions with foster and adoptive families in distress. *Child & Family Social Work, 10*(4), 257–268.
- Bentler, P. M. (1995). *EQS 6 Structural Equations Program Manual*. Encino, CA: Multivariate Software Co. Retrieved from [www.econ.upf.edu/~satorra/CourseSEMVienna2010/EQSMManual.pdf](http://www.econ.upf.edu/~satorra/CourseSEMVienna2010/EQSMManual.pdf)
- Bruce, J., Tarullo, A. R., & Gunnar, M. R. (2009). Disinhibited social behavior among internationally adopted children. *Development and Psychopathology, 21*(1), 157–171.
- Castle, J., Rutter, M., Beckett, C., Colvert, E., Groothues, C., Hawkins, A., ... Sonuga-Barke, E. (2006). Service use by families with children adopted from Romania. *Journal of Children's Services, 1*(1), 5–15.
- Chisholm, K. (1998). A three year follow-up of attachment and indiscriminate friendliness in children adopted from Romanian orphanages. *Child Development, 69*(4), 1092–1106.
- Croft, C., Beckett, C., Rutter, M., Castle, J., Colvert, E., Groothues, C., ... Sonuga-Barke, E. J. S. (2007). Early adolescent outcomes of institutionally-deprived and non-deprived adoptees. II: Language as a protective factor and a vulnerable outcome. *Journal of Child Psychology and Psychiatry, 48*(1), 31–44.
- Gauthier, K. & Genesee, F. (2011). Language development in internationally adopted children: a special case of early second language learning. *Child Development, 82*, 887–901.
- Glennen, S. (2002). Language development and delay in internationally adopted infants and toddlers: A review. *American Journal of Speech-Language Pathology, 11*(4), 333–339.
- Glennen, S. (2009). Speech and language guidelines for children adopted from abroad at older ages. *Topics in Language Disorders, 29*(1), 50–64.
- Glennen, S., & Bright, B. (2005). Five years later: Language in school-age internationally adopted children. *Seminars in Speech and Language, 26*(1), 86–101.
- Glennen, S., & Masters, M. G. (2002). Typical and atypical language development in infants and toddlers adopted from Eastern Europe. *American Journal of Speech-Language Pathology, 11*(4), 417–433.
- Glennen, S., Rosinsky-Grunhut, A., & Tracy, R. (2005). Linguistic interference between L1 and L2 in internationally adopted children. *Seminars in Speech and Language, 26*(1), 64–75.
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modeling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods, 6*(1), 53–60.
- Hwa-Froelich, D. A., & Matsuo, H. (2010). Communication development and differences in children adopted from China and Eastern Europe. *Language, Speech, and Hearing Services in Schools, 41*(3), 349–366.
- Kenny, D. A. (2008). *Measuring model fit*. Retrieved from <https://davidakenny.net/cm/fit.htm>

- Kenny, D. A. (2014). *Structural Equation Modeling*. Retrieved from <http://davidakenny.net/cm/causalm.htm>
- Kreppner, J., Kumsta, R., Rutter, M., Beckett, C., Castle, J., Stevens, S., & Sonuga-Barke, E. J. (2010). IV. Development course of deprivation-specific psychological patterns: Early manifestations, persistence to age 15, and clinical features. *Monographs of the Society for Research in Child Development, 75*(1), 79–101.
- Kuhl, P. K. (2007). Is speech learning ‘gated’ by the social brain? *Developmental Science, 10*(1), 110–120.
- Kumsta, R., Kreppner, J., Rutter, M., Beckett, C., Castle, J., Stevens, S., & Sonuga-Barke, E. J. (2010). III. Deprivation-specific psychological patterns. *Monographs of the Society for Research in Child Development, 75*(1), 48–78.
- Le Mare, L., Audet, K., & Kurytnik, K. (2007). A longitudinal study of service use in families of children adopted from Romanian orphanages. *International Journal of Behavioral Development, 31*(3), 242–251.
- Raaska, H., Elovainio, M., Sinkkonen, J., Stolt, S., Jalonen, I., Matomäki, J., ... Lapinleimu, H. (2013). Adopted children’s language difficulties and their relation to symptoms of reactive attachment disorder: FinAdo study. *Journal of Applied Developmental Psychology, 34*(3), 152–160.
- Rutter, M., Kreppner, J., & Sonuga-Barke, E. (2009). Emanuel Miller Lecture: Attachment insecurity, disinhibited attachment, and attachment disorders: where do research findings leave the concepts? *Journal of Child Psychology and Psychiatry, 50*(5), 529–543.
- Scott, K. A. (2009). Language outcomes of school-aged internationally adopted children: A systematic review of the literature. *Topics in Language Disorders, 29*(1), 65–81.
- Scott, K. A., Pollock, K., Roberts, J. A., & Krakow, R. (2013). Phonological processing skills of children adopted internationally. *American Journal of Speech-Language Pathology, 22*(4), 673–683.
- Scott, K. A., Roberts, J. A., & Glennen, S. (2011). How well do children who are internationally adopted acquire language? A meta-analysis. *Journal of Speech, Language, and Hearing Research, 54*(4), 1153–1169.
- Scott, K. A., Roberts, J. A., & Krakow, R. (2008). Oral and written language development of children adopted from China. *American Journal of Speech-Language Pathology, 17*(2), 150–160.
- Semel, E., Wiig, E. H., & Secord, W. A. (2003). *Clinical Evaluation of Language Fundamentals* (4th edition). San Antonio, TX: Pearson.
- Smyke, A. T., & Zeanah, C. H. (1999). *Disturbances of attachment interview*. Unpublished manuscript.
- U.S. State Department. (2014). Retrieved from [http://adoption.state.gov/about\\_us/statistics.php](http://adoption.state.gov/about_us/statistics.php)
- van den Dries, L., Juffer, F., van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2009). Fostering security? A meta-analysis of attachment in adopted children. *Children and Youth Services Review, 31*(3), 410–421.
- Van IJzendoorn, M. H., Juffer, F., & Poelhuis, C. W. K. (2005). Adoption and cognitive development: A meta-analytic comparison of adopted and nonadopted children’s IQ and school performance. *Psychological Bulletin, 131*(2), 301–316.
- Van Londen, W. M., Juffer, F., & van IJzendoorn, M. H. (2007). Attachment, cognitive, and motor development in adopted children: Short-term outcomes after international adoption. *Journal of Pediatric Psychology, 32*(10), 1249–1258.
- Weitzman, C., & Albers, L. (2005). Long-term developmental, behavioral, and attachment outcomes after international adoption. *Pediatric Clinics of North America, 52*(5), 1395–1419.
- Wiig, E. H., Secord, W. A., & Semel, E. (2004). *Clinical Evaluation of Language Fundamentals Preschool* (2nd edition). San Antonio, TX: Harcourt Assessment, Inc.
- Windsor, J., Benigno, J. P., Wing, C. A., Carroll, P. J., Koga, S. F., Nelson, C. A., ... Zeanah, C. H. (2011). Effect of foster care on young children’s language learning. *Child Development, 82*(4), 1040–1046.