# Social Communication Status as a Risk Factor for Language Development in Young Children Adopted from Eastern European Institutional Care

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## Abstract

This study examined the relationship between initial social communication status and language development in infants and toddlers recently adopted from Eastern European institutional care. The responding joint attention (RJA) and initiating joint attention (IJA) skills of 61 children were measured at arrival and compared against receptive and expressive language outcomes 6 months later. Birth weight, height at arrival and age at arrival were also examined as risk factors for slower language development.

Results indicated that receptive and expressive language outcomes were positively related to higher social communication skills. Specifically, RJA and IJA were significant predictors of receptive language development, and RJA was a significant predictor of overall expressive language development, above the contribution of age. Vocabulary was predicted by age at arrival and IJA skills. Height and birth weight were not predictive of language outcomes. Joint attention skills did not distinguish between higher and lower language performance when children were divided based on language cut-off scores. This study also found that adoption before an age of vocabulary acquisition did not distinguish between children with lower and higher language acquisition in this sample.

**Table of Contents**

## List of Tables

## Background

Early adverse experiences are known to substantially impact child development, having negative consequences that often are carried into adulthood. Studies of children who have experienced early social deprivation and neglect have described emotional, behavioral and cognitive delays associated with maltreatment (Perry, 2002). Interest in the skills and development of children who have suffered deprivation has increased over the last 20 years with political developments in the former USSR and Romania, and the subsequent influx of children adopted into other countries from these orphanages.

Longitudinal research projects, (e.g. Bucharest Early Intervention Project [BEIP] and the English and Romanian Adoptees study team [ERA]), have capitalized on the opportunity to study the effects of early deprivation through the "natural experiment" afforded by the ability to study children who have experienced institutionalization. These ongoing research projects have demonstrated that some variables are particularly sensitive to depriving early experiences, such as sub-optimal institutional care, although adequate institutional care may result in few negative outcomes (Johnson, Browne & Hamilton-Gianchritsis, 2006).

One area that has received attention in the recent research is social-emotional development and language, which has been a major area of concern for children adopted from institutional care (MacLean, 2003; Zeanah, Smyke & Settles, 2006). The majority of children make up developmental lags in language within a few years after adoption, with the trajectory of these gains varying with length of institutionalization. Preverbal skills have been shown to be a sensitive predictor of language outcomes in typical and atypical populations of children (Carpenter, Nagel & Tomasello, 1998; Morales et al., 2000; Morales, Mundy, & Rojas, 1998; Mundy et al, 2007; Mundy & Gomes, 1998; Mundy, Kasari, Sigman, & Ruskin, 1995; Mundy, Sigman and Kasari, 1990; Tomasello, 2000; Watt, Wetherby & Shumay, 2006). Some studies suggest that preverbal social communication skills are impaired in children from institutions (Kroupina et al., 2002). The overarching goal for this study is to investigate whether certain preverbal communication skills assessed soon after arrival are sensitive predictors of language delays in children adopted from institutions.

**Institutional Care and Risk for Development Delays**

Although institutional care in Eastern European countries has improved since the initiation of the BEIP and ERA studies in the 1990s, the quality of institutional care around the globe still varies widely (Glennen, 2007). Risk factors that have been associated with disturbances and delays in institutionalized and post-institutionalized children include pre- and perinatal hazards such as maternal alcohol use, malnutrition, prematurity and low birth-weight, as well as post-natal factors including diminished quality of care and neglect of physical and social needs (Gunnar, Bruce & Grotevant, 2000; MacLean, 2003; Zeanah et al., 2006). Genetics and socioeconomic status may also play a role in development, but developmental problems are seen in children who come from stable backgrounds as well (MacLean, 2004). Early deprivation has been known to result in numerous medical and growth problems emotional problems and developmental delays (Gunnar et al., 2000; MacLean, 2003; Van IJzendoorn & Juffer, 2006; Wilson, 2003; Zeanah et al., 2006).

Social deprivation early in life has been associated with alterations in brain structure and function beyond the effects of nutrition, and variations in brain development have been known to occur in response to stress (Sonuga-Barke, Schlotz & Rutter, 2010). Sonuga-Barke, Schlotz and Rutter suggested that psychosocial deprivation of the institutional environment resulted in physical stunting and developmental delays in children who spent more than 6 months in institutional care, even in the absence of poor nutrition.

Despite their early experiences, many children experience major developmental catch-up soon after adoption into more nurturing home environments (Gunnar et al., 2000; Mason & Narad, 2005; Van IJzendoorn & Juffer, 2006). General developmental outcomes are better for children who are adopted at younger ages and who spend less time in institutional care (Gunnar et al., 2000; Rutter, Kreppner & O'Connor, 2001). Rutter et al. (2001) reported that by age 6 years, 70% of severely deprived Romanian children who had been adopted into the U.K. exhibited typical developmental functioning, while 25% of the children adopted after age 2 were functioning typically.

A number of children from institutions in which there is inadequate care continue to exhibit difficulties in the social-emotional domain (Beckett et al., 2007; Glennen, 2007; Glennen & Bright, 2005; Gindis, 2005; Gunnar et al., 2000; Van IJzendoorn & Juffer, 2006). Although the expression, severity and co-occurrence of difficulties vary among children studied, they seem to constitute a cluster of disturbances distinct from those seen in children from other depriving backgrounds; these include features characteristic of autism, attachment disturbances, inattention/overactivity and cognitive impairments, which persisted years after adoption (Kumsta et al., 2010).

In summary, many recent studies have looked at the early experiences and subsequent development of children who have spent their early months in an institutional environment. Research supports the positive impact of adoption on development, and demonstrates that post-institutionalized children are generally resilient against the effects of early adversity. The large majority of children, once placed in a nurturing environment, quickly begin to recover physical, cognitive and communicative functioning. The developmental gap often closes for these children within a matter of years (Gunnar et al., 2000; Van IJzendoorn & Juffer, 2006). However, a significant number of children do not catch up to their peers in one or multiple domains. Most often, these are children who were adopted at later ages, spent the longest time in institutional care, or experienced the greatest levels of deprivation, but problems do persist in some younger children (Geren, Snedeker & Ax, 2005; Glennen & Masters, 2002; Gunnar et al., 2000; Roberts et al., 2005).

**Language Development in Children from Institutional Care**

Communication and language delays in previously institutionalized children are common, and are attributable to limited or inadequate social, cognitive and language stimulation, even in institutions that provide better nutritional, physical and emotional care (Glennen, 2002; Gunnar et al., 2000; Zeanah, 2006). Institutions have been characterized in the literature as understaffed and underfunded, resulting in high ratios of caregivers to children and an emphasis on attending to basic needs rather than on engaging children in social interactions, or providing cognitively enriching experiences (Gunnar, 2000; Zeanah, 2006). High turn-over rates of caregivers and frequently changing shifts in caregivers contribute to social-cognitive delays through discouraging the development of personal social attachments (Gunnar et al., 2000; MacLean, 2003; Nelson, Zeanah & Fox, 2007; Tartullo, Bruce & Gunnar, 2001; Van Ijzendoorn & Juffer, 2006; Zeanah et al., 2006). Length of institutionalization and age at adoption are the most significant risk factors for communication delays, as these limit opportunities for social interactions and exposure to language (Glennen, 2002a; Zeanah, 2006). Thus, social communication deficits seen in children raised in institutional care may be a learned behavior: children may grow unresponsive to social stimuli as a consequence of a lack of reinforcement from social partners (Zeanah, 2006).

Although conditions are generally improved from those documented in the last 20 years, and the majority of children in even the worst conditions catch up to their peers within a few years of adoption, many children continue to experience delays and difficulties with communication and language. Expressive language seems to be more affected than receptive language (Zeanah, 2006), and placement in a less adverse environment, such as foster care, improves language outcomes at large. Adoption to a permanent home results in the best overall language outcomes.

A pair of studies by Windsor et al. (2007; in press) investigated the effects of institutional care on the language development of children in Romania who were placed in Romanian foster families. They compared the children's language outcomes with children remaining in institutions and with a group of same-age peers who had never experienced institutional care. The researchers measured children's expressive and receptive language, use of grammar and speech sound production. At 30 months, children who had spent the fewest months in foster care, and those who remained in institutional care were delayed in all measures, while children who spent the longest period of time in foster care had similar language skills to the typically-developing comparison group. Children who remained institutionalized used half the number of utterances and one third the number of words than children who were never institutionalized; their phonological processes were also more simplified than the comparison group and the children who spent more time in foster care. Additionally, physical measures of height correlated with all language measures except mean length of utterance (MLU), while MLU was correlated with length of time in foster care and with vocabulary size (Windsor et al., 2007). A follow-up study of the children at 42 months of age showed that children placed in foster care by 15 months of age developed age-appropriate language skills by 42 months of age, and children who were placed by 24 months had MLUs comparable to the typically developing peer group. On the other hand, children who were placed in foster care after 24 months of age had the same level of expressive and receptive language skills as the children who remained in institutional care. The authors suggested that this supports an effect of placement age on language outcomes (Windsor et al., in press).

A longitudinal study of language outcomes in children adopted from institutional care into the U.K. demonstrated that institutional care that lasted more than 6 months resulted in negative language and cognitive outcomes, regardless of the length of institutionalization beyond 6 months (Croft et al., 2007). Croft and colleagues assessed the language outcomes of 132 very young children adopted from Romanian institutions at 6 and 11 years of age. Children spent from fewer than 6 months to 42 months in institutional care. Results showed that institutional care that ended by 6 months resulted in few negative outcomes, and these children performed as well as typically developing peers at the school-age assessment points. Further, they found no effect of duration of institutional care on language outcomes after 6 months. Children who were institutionalized between 6 and 42 months continued to experience language and cognitive delays at 6 and 11 years of age. However, they did find significant differences between children who had some language ability at adoption and those who had no language at arrival (language ability was defined as attempting to produce words). Nevertheless, the majority of children in the sample had acquired typical language and cognitive skills by the age of 11 years. Croft et al. (2007) suggested that the presence or absence of early language abilities may determine later language outcomes rather than the length of institutional care, if it lasts beyond a few months.

Studies of language development in young children who were adopted from Eastern European and Chinese institutions into North America have focused on the nature and trajectory of their language acquisition (Glennen, 2005; Glennen, 2007; Glennen & Bright, 2005; Glennen & Masters, 2002; Pollock, 2005; Roberts, Pollock & Krakow, 2005). These studies, which mainly involved children adopted by 3 years of age, revealed a pattern that differs in several ways from young children learning a second language. Second language learners usually are simultaneously learning both languages and can rely on knowledge from one language to learn the other. Children who are adopted internationally, however, typically live in monolingual homes where the first language is unknown. Their language development is sequential; the first language is halted before exposure to the second language. Young children undergo attrition of the native language within the first few months after adoption, apparently losing all ability in their first language within the first year (Glennen, 2002a). The adoptive language has therefore been called a second first language, because it actually replaces the first language as the child's only functional language (Glennen, 2007; Pollock, 2005).

The general findings of studies of language acquisition in previously institutionalized children adopted into North America demonstrate that they follow the typical pattern of native English language acquisition, but with a different trajectory, which varies with the age of the child at adoption (Glennen, 2002a).

One of the earliest studies of language development that demonstrates this pattern was conducted by Glennen and Masters in 2002. This study followed 130 infants and toddlers from Eastern Europe longitudinally from adoption to 40 months of age. Children had been adopted between birth and 30 months of age. They measured the following variables using parent surveys that were completed every 3 months: overall language, vocabulary, MLU and grammatical morpheme development.

Children who had been adopted before 12 months of age acquired English language skills commensurate with typically-developing peers by 2 years post adoption. They began using words at the same time as their non-adopted peers and reached English norms for both vocabulary and MLU at 24 months of age. Children adopted after 12 months of age quickly acquired new vocabulary words, but they demonstrated incremental lags in vocabulary growth and MLU with increases in age at adoption. Those who were adopted between 13 and 24 months of age were delayed 1 to 3 months after 1.5 to 2 years in their adoptive homes. Children adopted after 24 months of age were delayed 8 to 10 months after 1 year in their adoptive homes.

Based on these results, Glennen and Masters stressed that children who are not making rapid gains in vocabulary and language skills within the first month after adoption are at risk for continued delays. Research with children adopted from China confirms these findings (Pollock, 2005; Roberts, Pollock & Krakow, 2005).

Glennen (2005) sought to establish guidelines for language assessment in internationally adopted infants and toddlers. Twenty-eight infants and toddlers from Eastern Europe were assessed for language and articulation skills at 1 month post-adoption. Language outcomes included the MacArthur Communicative Development Inventory-Words and Gestures (MCDI-WG) and the Communication and Symbolic Behavior Scales (CSBS). Children were identified as language delayed if they failed to meet the 20$^{th}$ percentile for the peer group on the CSBS total score, or if they did not meet 20$^{th}$ percentile scores on three out of six areas tested by the MCDI and CSBS, which included receptive and expressive vocabulary, social communication, symbolic communication, play, communicative means, articulation and a parent report of general communicative development. Following these guidelines, 19 children were identified as normally developing, five were identified as in need of speech and language services, and two were recommended for follow-up evaluation (Glennen, 2005).

Glennen (2007) followed up on the same group of children after 1 year in the adoptive home, when they were 2 years old (Glennen, 2007). This study sought to determine which of the measures used in the 2005 study accurately predicted language delays, and to fine-tune assessment recommendations using age 2 outcomes. The language outcomes included the Preschool Language Scales-3 (PLS-3) or the PLS-4, the Goldman Fristoe Test of Articulation-2 (GFTA-2), the MCDI-WG, MLU collected from language samples, and a hearing test. Correlation analyses showed that the MCDI-WG Words Understood score predicted four out of five later language outcomes (all but PLS), and the CSBS Behavior Sample total score predicted four out of the five later language outcomes (all but MLU). The CSBS Behavior Sample is made up of three composite scores: Speech, Symbolic, and Social, which measure pre-verbal communication skills including vocalizations, symbolic play and social communication. Several of the children who had scored high on the Social Communication Composite at 1 year of age had slow language development at 2 years of age, but these children also had low receptive vocabularies.

The only composite score that distinguished between slow and normal language development at 2 years of age was the Speech Composite. As a group, children performed within the norms for their non-adopted peers on the Social Composite, which measures eye contact, joint attention, behavior regulation, social interaction, and conventional and distal gestures. When only the CSBS Behavior Sample total score and the MCDI Words Understood were used to retrospectively rescreen the children at 1 year of age, all but one of the children with actual delays were captured by these measures.

This study demonstrates that the best predictors for language performance at age 2 are children's pre-verbal communication skills and number of words understood.

**Long-term Effects on Language**

Even children who demonstrate seemingly adequate language skills as preschoolers may struggle with language applied to learning in the academic setting. Gunnar et al. (2000) noted that clinical observations of language development in adolescents adopted from institutional care revealed deficits in language used for expressing emotion, requesting help and expressing abstract ideas. Gindis (2005) also cited cases of internationally adopted children who used language appropriately in social situations, yet were unable to use language for problem solving and abstract thinking. He attributed these difficulties to what he called a "cumulative cognitive deficit," a gap in cognitive ability that widens as children move through school and demands for higher-level language abilities increase. However, overall it is unclear whether academic language and learning difficulties are the result of impaired cognitive abilities or impaired language deficits (Gunnar et al., 2000).

As the research on language development in this population has demonstrated, newly-adopted children with below-normal preverbal communication skills and poor receptive vocabularies are deemed most at risk for continuing language delays. The research also seems to indicate the importance of early identification of preverbal communication delays. There is currently, however, limited data on the preverbal communication skills of children adopted from institutional care.

A few studies suggest that children from institutional environments have unusual disturbances in preverbal skills. Kroupina et al. (2002) found that some post-institutionalized children exhibit deficits in eye gaze and joint attention behaviors. She found that children from institutional care tend to use joint attention behaviors infrequently overall, and proportionately more behavior regulation bids than attempts to share information or experiences with a social purpose (Kroupina et al., 2002). The current study expands on what we know about the preverbal communication skills in children from institutional care by reporting on the joint attention behaviors assessed in a group of children from institutional care and examining the relationship of those behaviors to developing language skills.

**Joint Attention**

It has been suggested that early social communication skills that develop prior to language form the foundation for other skills that are learned in a social context, namely social interaction, learning and language (Mundy & Newell, 2007). Social cognition and social perspective taking are also intertwined with the development of preverbal communication skills (Charman, 2000; Mundy & Newell, 2007). Preverbal skills have been shown to predict language outcomes in typical and atypical populations of children, and therefore constitute an important area for research in children from institutional care, who are at risk for significant language delays.

Joint attention skills in particular have been identified as a predictor of early language development in typically developing children and in children with disabilities such as autism, Down syndrome and developmental delays (Harris, Kasari & Sigman, 1996; Morales, et al., 2000; Mundy, Sigman & Kasari, 1990; Tomasello, 1988; Tomasello & Farrar, 1986; Ulvund & Smith, 1996).

A simple definition of joint attention is the ability to coordinate visual attention toward a referent for a social purpose (Mundy et al., 2007; Mundy & Newell, 2007). Joint attention can be categorized into acts of responding joint attention (RJA) and acts of initiating joint attention (IJA). Responding joint attention involves following the head movement, gaze and gestures of another toward a referent. Initiating joint attention involves directing the attention of another using gaze or gestures, such as reaching and pointing, for the purpose of sharing interests or experiences (Mundy et al., 2007; Mundy, Sullivan, & Mastergeorge, 2009). For example, a mother playing with her child may turn to look and point toward a toy and then return her gaze to her child. The mother in this example is using initiating joint attention to share interest in the toy with her child. When the child averts his eyes from the mother to look at the toy she referenced, the child is using responding joint attention. The same gestures that are used to establish social interest can be used to obtain desired events, activities and objects. These are known as behavior regulation acts. Behavior regulation can likewise be categorized into acts of responding behavior regulation (RBR) and initiating behavior regulation (IBR).

Infants begin to engage in early forms of intentional communication, for instance looking where others are looking, before 6 months of age (Carpenter et al., 1998; Mundy & Newell, 2007; Tomasello, 1988). They begin to engage in extended periods of joint engagement with others at 9 months of age and reliably follow the gaze of others at around 1 year of age (Carpenter et al., 1998). At this time, children are beginning to understand themselves and others as intentional agents (Tomasello, 2000). Between 8 and 13 months, gestures such as reaching, showing, giving and pointing emerge (Crais et al., 2004).

## Joint Attention and Language Development

Joint attention is thought to provide a context for early language learning. According to the social-pragmatic theory of language acquisition proposed by Tomasello (1988; 2001), joint attention interactions with caregivers help to scaffold a child into language. In these interactions, children learn the labels for objects and events. More advanced language skills build upon words learned in these early interactions (Tomasello, 1988; 2001; Watt et al., 2006). Joint attention skills in infancy have been correlated with vocabulary learning, receptive and expressive language, and overall language ability (Carpenter et al., 1998; Morales et al., 1998; Morales et al., 2000; Mundy & Gomes, 1998; Mundy et al., 1990; Mundy et al., 1995; Mundy et al, 2007; Tomasello, 2000; Watt et al., 2006).

**Word learning.** Tomasello (2000) proposed that word learning begins at around 1 year of age because this coincides with the age at which children begin to reliably use joint attention acts and begin showing signs of understanding language (Tomasello, 2000). Mundy et al. (1995) found that a child's ability to follow the point of a tester (responding joint attention) strongly correlated with receptive language development in a sample of normally developing children between 8 and 28 months of age (Mundy et al., 1995). A study by Morales et al. (1998) showed that infants who were better at following the gaze of their caregiver at 6 months of age had better receptive vocabularies at 12 months of age and higher expressive vocabularies at 18, 21 and 24 months of age (Morales et al., 1998).

Carpenter et al. (1998) found that word learning and production in infants were predicted by the amount of time spent in joint engagement with their mothers. The researchers looked for correlations between word production and joint engagement when infants reached the stage at which they were participating in at least 30-second periods of joint engagement. They found that time spent in joint engagement correlated with word production during the same time period that joint engagement reached 30 seconds. The researchers suggest that word production is not determined by a particular chronological age, but by the age at which they begin to engage in more extended periods of joint engagement. Additionally, joint engagement at 9 to 11 months of age correlated with word comprehension between 11 and 15 months of age (Carpenter et al., 1998).

Baldwin et al. (1996) conducted a laboratory experiment in which they attempted to teach infants age 18 to 20 months the labels for novel objects under two conditions. In the first condition, a familiar experimenter labeled the object while sharing joint attention to the object with the infant. In the second condition, the object label was uttered by an out-of-sight experimenter with whom the infant had been familiarized. Infants' patterns of gaze indicated that they paid attention to the toy and the speaker under both conditions. However, infants reliably mapped the word to the object in the first condition, where joint attention had been established, but not in the second condition where the out-of-sight researcher did not share joint attention (Baldwin et al., 1996). The researchers stated that the children determined that the label was relevant to the object based on joint attention alone. This study demonstrates that infants aged 18 to 20 months rely on visual cues in joint attention interactions in establishing connections between referents and their labels.

Morales et al. (2000) found that early RJA predicts both expressive and receptive vocabulary at 30 months of age. The longitudinal study followed 22 infants from 6 to 24 months of age. They assessed the infants' RJA skills every three months. At 24 and 30 months of age, they collected parent report data on expressive language using the MDCI and assessed children's receptive and expressive vocabulary at 30 months of age using the Expressive Vocabulary Test (EVT) and the Peabody Picture Vocabulary Test (PPVT). Results indicated that RJA performance at 6 to 18 of age months predicted both receptive and expressive vocabulary at 30 months of age, and RJA at 12 months of age significantly correlated with vocabulary at 24 months of age. The researchers suggested that measures of RJA during the 6-to-18 month period can provide important information about later language development which cannot be predicted by language and cognitive measures (Morales et al., 2000).

**Receptive and expressive language.** The studies below have looked at the relationships between different types of joint attention and later language. The general findings of these studies demonstrate that RJA correlates with receptive language, while IJA correlates with expressive language in typically developing children.

Mundy and Gomes (1998) looked RJA and receptive language in children 14 to 18 months of age. They used the Early Social Communication Scales (ESCS) to measure joint attention skills and the Reynell Developmental Language Scales (RDLS) to measure language outcomes. Follow-up assessments were conducted after 16 weeks to examine the predictive relationship of the joint attention measures on language. They found that RJA correlated with receptive language. The RJA score in this study was the percentage of trials in which a child correctly turned their head in response to the tester's look or point. They also found that the "consolidated" IJA score (C-IJA) correlated with expressive language. The C-IJA score was a ratio of the number of higher-level IJA bids to overall IJA bids.

Watt et al. (2006) examined the relationship between early prelinguistic skills and later language in 160 typically developing children early and late in their second year of life. The researchers used the CSBS to measure the following prelinguistic skills: gaze following, joint attention acts, behavior regulation bids, social interaction and conventional gestures. Expressive and receptive language were measured using the Mullen Scales of Early Learning (MSEL). They found that joint attention acts used early in the second year of life uniquely predicted MSEL expressive language scores, above the contribution of other prelinguistic skills (e.g. inventory of gestures, comprehension and consonant inventory). Joint attention acts were no longer predictive of expressive language scores late in the second year of life: late predictors of expressive language scores were comprehension and consonant inventory. The authors reasoned that joint attention and gestures may influence later language outcomes in impacting infants' comprehension and consonant inventory development.

Mundy et al. (2007) followed the development of joint attention skills in infants from 9 to 24 months of age. They used the ESCS to measure the following skills: IJA, RJA, IBR and RBR. Receptive and Expressive language was measured using RDLS and the MCDI. They looked at the predictive value of the JA and BR skills on the following language scores at 24 months of age: the RDLS Receptive Language score, the RDLS Expressive Language score, the MCDI Expressive score, and a composite language score (combining the RDLS and MCDI scores). Results showed that IJA skills at 9, 15 and 18 months of age and RJA skills at 9 and 12 months of age were significantly correlated with receptive language performance at 24 months of age. Eye contact at 9 and 15 months of age predicted expressive language on the RDLS, and at 18 months of age predicted expressive language on the MCDI and the composite language scores. RJA at 9 months of age and IJA at 18 months of age correlated with expressive language as measured by the MCDI score. After controlling for general cognition (measured by the Bayley Scales), Mundy et al. (2007) found that IJA at 18 months of age and RJA at 12 months of age remained significant predictors of language ability at 24 months of age.

**Joint attention and language in children with disabilities.** Joint attention skills have been studied extensively in children with Down syndrome, developmental delays and autism spectrum disorders, and have been shown to predict both receptive and expressive vocabulary in these populations.

Mundy et al. (1995) found that in children with Down syndrome, nonverbal requesting (initiating behavior regulation), initiating joint attention and social interaction predicted expressive language development. The 37 children with Down syndrome all had fewer than 20 words and a mean mental age of 13.7 months. Nonverbal communication skills were measured using the ESCS and language was measured using the RDLS. The study also found correlations between RJA and receptive language in normally developing children (Mundy et al., 1995). In a subsequent study of children with Down syndrome, the length of time spent in joint attention interactions was also associated with gains in receptive language (Harris et al., 1996). Harris et al. (1996) measured joint attention in 28 children with Down syndrome and their language 13 months later. Joint attention was measured by videotaping parents and children in play interactions. Language was measured using RDLS. Length of time spent in joint attention interactions was associated with gains in receptive language, while frequency of joint attention was negatively associated with receptive language (Harris et al., 1996).

Smith, Mirenda, and Zaidman-Zait (2007) followed the vocabulary development of 35 children with autism over 2 years. Language and gesture development was measured using the MCDI. They found that the number of IJA gestures was associated with vocabulary development, and distinguished between children with a slower rate of vocabulary growth from children with a higher rate of vocabulary growth.

Mundy et al. (1990) looked at joint attention and language development in 15 children with a diagnosis of autism and initial vocabulary of fewer than five words. Joint attention was measured using the ESCS and language was measured using the RDLS. The researchers used summary scores for joint attention and language age for their correlations and did not distinguish between different joint attention skills or language skills. Results showed that joint attention skills predicted language in the children at the follow-up assessment, and also correlated with language scores at the initial assessment.

Ulvund and Smith (1996) conducted a longitudinal study of preverbal communication and language in children with low birth weight, who are usually delayed in language skills. The ESCS was used to measure pre-verbal communication skills at 13 months of age and the RLDS was used to measure language at 2, 3, and 5 years of age. At ages 2 and 3, RJA, IJA, RBR and IBR correlated with receptive language, and IJA and IBR were correlated with expressive language.

**Summary**

The available research demonstrates that children who have experienced social deprivation are at high risk for continuing developmental delays, including social communication and language. The degree of risk has been demonstrated to vary with the length of institutional care and the age of the child at adoption. Social communication and language delays are understood to be a consequence of sub-optimal institutional care, which often provides diminished opportunities for enriching social and communicative interactions as well as cognitive stimulation. Although language development has been studied in this population, few studies have addressed social communication skills soon after arrival. The communication abilities of newly-arrived children are difficult to measure because they cannot be assessed accurately in either the birth or the second language (Glennen, 2007; Pollock, 2005). In addition, many children from institutions may have limited verbal skills before adoption. However, it is important to identify children at risk for language delays as early as possible.

Some research findings suggest that preverbal communication skills are impaired in some children from institutional care. This observation is important because preverbal communication skills, specifically responding and initiating joint attention, have been shown to predict language outcomes in typical children and in children with disabilities.

Across populations, RJA has been shown to predict vocabulary acquisition, receptive and expressive language and IJA has been shown to predict expressive language. In children with autism, joint attention skills distinguished between children with higher vocabularies and those with lower vocabularies. Joint attention skills in children adopted from institutional care have not been fully investigated with regard to developmental outcomes. Because of the abundance of literature demonstrating the relationship between preverbal skills and verbal language in other populations, there should be a relationship between the preverbal skills and later language outcomes of children who have experienced institutional care.

This study seeks to describe the relationships among risk factors, RJA and higher-level IJA skills and language performance in a group of young children recently adopted from institutional care. Three language outcomes were examined: receptive language, expressive language and reported vocabulary size. Although MLU has been examined in previous studies, it was not examined here because the majority of children in this study were at the one-word stage,

Based on the available research, the following hypotheses were formulated:

Initiating and responding joint attention skills assessed soon after adoption will be related to language abilities after 6 months in an adoptive home environment. It is hypothesized that receptive language outcomes will be predicted by RJA skills. It is hypothesized that expressive language outcomes will be predicted by RJA and IJA skills, but not by behavior regulation acts (BR) because JA and BR are theorized to reflect different cognitive processes (Mundy et al., 2007) and have different communicative functions (communicating social interest versus obtaining activities and objects). It is also hypothesized that RJA and IJA skills at arrival will distinguish between children with higher and lower language performance, following similar findings by Smith (2007) in children with autism and the strong correlation between RJA and language evident in the research literature. Based on the trend in the research that age of adoption and length of institutional care (often correlated in study samples) are associated with lower language outcomes, it is hypothesized that the variable of age at adoption, will predict language outcomes at 6 months post adoption. This study also investigates whether adoption before the typical age of expressive vocabulary acquisition will distinguish between children's language outcomes at 6 months post arrival.

Based on the research literature documenting physical factors as a risk for developmental delays, this study also investigates the role of birth weight and height at arrival on language assessments. Height is representative of growth delays, which have been associated with lower developmental outcomes in children from institutional care. Birth weight represents the influence of prenatal hazards such as malnutrition, poor medical care and prematurity and indicates degree of adversity in this population. The children in this sample had heights and birth weights that put them at risk for growth delays. Based on previous research that language and other aspects of development are vulnerable to these factors; it is hypothesized that height at arrival and birth weight will predict language outcomes.

## Method

### Participants

Participants in the current study were 61 children (29 male, 32 female) adopted from Eastern Europe who were a subgroup of children originally recruited to participate in a growth hormone study. The children were adopted from Russia, Kazakhstan and Ukraine. Only children who were age 7.5 months to 32.0 months at arrival (*M* = 16.9, *sd* = 5.1) were included in this sample because the social communication measure can only be used for assessment of children within this age range. Other children were excluded due to an incomplete data set resulting from behavioral problems during the test administration or because they failed to show up for the follow-up visit. Children were also excluded for cognitive factors (diagnosed with or at risk for Fetal Alcohol syndrome). Medical records indicated that none of the children in the data set had significant vision or hearing problems; however mild vision and hearing abnormalities were noted for six and five children, respectively. The initial assessments took place within 1 month of adoption (*M* = 16.9 days, *sd* = 6.1). Follow-up assessments took place 6 months later (*M* = 6.1, *sd* = .3). The mean age of children at the time of the second assessment was 23.0 months (*sd* = 5.1). The youngest child in the sample at the time of the second assessment was 13.3 months, and the oldest child was 37.8 months.

Children had spent from 0 to 24 months in institutional care (*M*= 12.1, *sd* = 5.1). With the exception of three children, all children in the sample spent 2 or fewer months with their biological parents before entering institutional care; 78% were institutionalized from birth. Therefore, the variable of age at arrival was used to represent time in institutional care as well as chronological age because these two variables were highly correlated and because age of adoption is confounded with length of institutional care. Of the children who spent more than 2 months with their biological parents, one spent 5 months, one 10 months and one 13 months. Pre-adoptive history indicated that these three children were removed to institutional care because of neglect; therefore, it was determined that it was consistent to use age at arrival rather than length of institutionalization even for these three children because it represents their length of sub-optimal care.

Parental reports of pre-adoptive care indicated that only 18% of children experienced care that was either poor or very poor prior to adoption. Medical reports indicated that children had significant growth problems: pre-adoptive medical reports indicated that 40% of children had low birth weights (*M* = 2.3 kg, *sd* = .7) and medical evaluation at the time of arrival indicated that 13% of children had heights below 2 standard deviations (*M* = -1.0, *sd* = .9). See Table 1 for a summary of the participant sample.

Participants were divided into groups based on their performance on three language outcomes: receptive language, expressive language and vocabulary size.

***High and low language.*** The 20$^{th}$ percentile was used to categorize children as developing higher or lower language skills on the MSEL at 1 year post-adoption. This was calculated from the mean score of the sample group (not the mean of the standardization sample). For the MSEL Receptive Scale, 12 children were categorized into the lower group (LR) and 49 children into the higher group (HR). For the MSEL

Expressive Scale, 10 children were categorized into the lower group (LE) and 51 children into the higher group (HE). Four of the children in the sample fell into both groups.

***High and low vocabulary***. High and low vocabulary was delineated using Glennen's preliminary clinical guidelines for identifying children from international adoption who are at risk for language delays (see Glennen, 2002b). This chart was chosen because it was not possible to calculate percentile scores due to the limited number of vocabulary words most children had acquired at 6 months post-arrival. Children producing below the mid-range for their age according to this developmental chart were assigned to the low vocabulary group. There were 10 children categorized into the lower group (LV) and 51 into the higher group (HV). Five of these children also were in the lower expressive group, and three of those five were categorized as low in vocabulary, receptive and expressive language.

***High and low age at arrival***. Age at arrival is confounded in this sample with length of institutional care, with most children in institutional care since birth. Fifteen months was chosen as a cut-off because this is an age at which many children typically begin using their first words, and placement in a less adverse environment by this age has been associated with better language outcomes. Children were placed in the low age at arrival (LA) group if they were adopted by 15 months of age, and high age at arrival (HA) if adopted after 15 months of age. There were 29 children in the lower age group ($M$ = 12.9 months) and 31 children in the higher age group ($M$ = 20.5), see Table 6.

## Procedures

Initial assessments of children's RJA, IJA and BR skills were taken at arrival (within 1 month post-adoption), while outcome measures of receptive and expressive language and expressive vocabulary were taken 6 months later. Six months was used as a marker because it is not possible to reliably measure children's language ability at arrival, because children were transitioning from a first language and culture to learning a second language. Children were also seen for a medical evaluation at 6 months post arrival, making this an opportune time to appraise their communication development. All of the children in this sample had reached 12 months of age by the second assessment, so could be expected to show some expressive language skills by 6 months post arrival (Glennen, 2002a). All assessments used in this study, except for the parent report, were completed in a laboratory setting and were videotaped for later analysis. The child's primary caregiver was present for all assessments. The parent report was completed by the primary caregiver at the second assessment.

## Initial Assessment

*Early Social Communication Scales (ESCS).* Children's preverbal social communication skills were assessed using the Early Social Communication Scales (ESCS; Mundy et al., 2003). The ESCS was selected as an initial assessment because it measures nonverbal communication skills typically developed in children aged 8 to 30 months. The ESCS is a 20-minute, videotaped, structured assessment of social interaction, joint attention and behavior regulation. Videotapes were reviewed by two independent coders. The percent agreement of the two independent coders for approximately 20% of the ESCS data sets was more than 90%.

The following scores from the ESCS were used as initial measurements of children's joint attention skills at arrival: High-level Initiates Joint Attention (IJA) and Responds to Joint Attention (RJA). The term "high-level" comes from the ESCS, and refers to the use of gestures (e.g., pointing, reaching, or raising objects) with or without eye contact, but not to eye gaze alone. Throughout the remainder of this paper, IJA will refer to "higher-level" joint attention initiations, and BR will be used to refer to "higher-level" behavior regulation bids. These three ESCS scores were used to predict language outcomes at 6 months post arrival because they have been shown to be positively correlated with language performance in young children. High-level Behavior Regulation (BR) was used as a comparison variable because it has the same form as IJA but a different function. Table 2 outlines each skill used in the assessment, describes how it was measured and gives examples of the behaviors associated with each skill.

Age at arrival, birth weight and height were used as predictors of language performance at 6 months post arrival. These measurements were obtained from medical records after the child's clinic visits at arrival and at 6 months post arrival. Height was included because it represents post-natal physical growth, which has been connected to general developmental outcomes. Birth weight was chosen because it is representative of pre-natal hazards, which have also been connected to general developmental outcomes.

**Six-Month Assessment**

The following assessments were administered at the 6-month return visit: the Mullen Scales of Early Learning (Mullen, 1995) and the MacArthur Communicative Development Inventories (Fenson et al., 1993).

*Mullen Scales of Early Learning (MSEL).* The MSEL is used to assess development in infants and toddlers from birth through 68 months of age. The MSEL was selected for the 6-month outcomes because it is a test of general development that measures fine motor, gross motor, visual reception, receptive language and expressive language as separate scores; it is brief and can be administered quickly to young children. MSEL scores can be represented as (age-adjusted) t-scores, percentile scores and age equivalency scores. The t-scores of the Receptive and Expressive Language scales were used in this analysis as outcome measures.

*MacArthur Communicative Development Inventories (MCDI).* The MCDI is a parent-report measure of early language development in children aged 8 to 30 months. The MCDI has two forms and several sections, which measure receptive language, gesture development, expressive vocabulary, grammatical and morphological structures, and MLU.

The Words and Gestures (MCDI-WG) was used for 14 children, and the Words and Sentences form (MCDI-WS) was used for 47 children. The MCDI-WG is normed for children up to 15 months of age. A vocabulary checklist that included the additional vocabulary items from the MCDI-WS was provided to the children who were administered the MCDI-WG but were older than 15 months at the time of assessment (*n*

= 10). It was decided to use total number of words measured by the Number of Words Produced inventory as the vocabulary measure and not a standard score because the large majority of children scored below the $5^{th}$ percentile on this inventory. Using the percentile score would have been uninformative and not useful for data analysis.

**Data Analysis Procedures**

Statistical analysis was completed using Predictive Analytic Software (PASW) for Mac 18, Grad Pack (SPSS, Inc., 2009). Preliminary data analysis was used to examine group performance on all measures and to examine how risk factors for language delays correlated with one another. Pearson product moment correlations were used for all correlation analyses. The significance level of $p < .05$ was divided by the number of comparisons to correct for Type I error. This resulted in a significance level of $p < .01$.

Next, linear regression analysis was performed to assess the predictive values of the risk factors (IJA, RJA, BR, age at arrival, height, and birth weight) on language performance at 6 months post arrival. Behavior regulation was included in the regression to test the hypothesis that it would not be a predictive factor. For each of the three language scores (Receptive, Expressive, and Words Produced), two separate regressions were calculated (for a total of six regressions). The first regression for each score was carried out for the entire group of 61 participants, while the second regression was calculated for a subgroup of 54 for whom birth weight was available. Results of the main group are presented first, followed by results of the subgroup.

Then, the data were analyzed to identify whether any differences existed in RJA and IJA between groups of children who had higher and lower performance on language assessments (receptive language, expressive language and vocabulary). Because the language variables were expected to be inter-correlated, group comparisons were made using multivariate analysis of variance (MANOVA) with a significance level of $p < .05$. Age was included in the model as a covariate because BR was correlated with age. Finally, a one-way analysis of variance (ANOVA) was used to compare language performance between children who were younger and older than 15 months of age at arrival. Test results were deemed significant at the level of $p < .05$.

## Results

The main hypothesis of this research study was that responding and initiating joint attention at arrival would be related to language abilities at 6 months post arrival. The RJA, IJA and BR results are discussed first followed by language results, association of language and risk factors, and a comparison of high and low language groups on social communication skills.

### Preliminary Data Analysis

**RJA, IJA and BR.** The children's group performance on the social communication measure, ESCS, is shown in Table 3. Overall, children responded to half of all RJA bids ($M = 48.6$, $sd = 39.3$), and produced almost five times the number of BR bids ($M = 6.9$, $sd = 6.4$) than IJA initiations ($M = 1.5$, $sd = 2.0$).

Preliminary analysis revealed a relationship between age at arrival and both RJA ($r = .62$, $n = 61$, $p = .001$) and BR ($r = .66$, $n = 61$, $p = .001$). Height at arrival and birth weight were not significantly associated with social communication status at arrival. Responding joint attention was significantly associated with BR ($r = .54$, $n = 61$, $p =$

.001), and had a relationship approaching the corrected significance level of $p < .01$ with IJA ($r = .28$ $n = 61$, $p = .03$). Although IJA and BR employ the same representational gestures, they were found to be uncorrelated. Table 7 shows the results of all correlations.

**Language.** Results of the MSEL and MCDI assessments at 6 months post-arrival, including mean performance and standard deviations, are shown in Table 3. Overall, children's performance on the MSEL was normally distributed with a group mean of 42.4 (*sd* = 8.8) for the Expressive Language scale (min = 22, max = 62) and 41.3 (*sd* = 20.4) for the Receptive Language scale (min = 20, max = 64). In Receptive Language, 12 children performed below the $20^{th}$ percentile ($M = 27.8$, $sd = 4.0$), and in Expressive Language, 10 children performed below the $20^{th}$ percentile ($M = 29.6$, $sd = 3.8$). Females outperformed males on the Expressive, but not Receptive scale, and a t-test showed that this difference was statistically significant, $t(59) = 3.2$, $p = .01$.

MCDI Words Produced was an additional indication of expressive language performance. As a group, results were similar to the MSEL: 10 children had productive vocabularies below the mid-range based on charts of vocabulary development expectations (Glennen, 2002b).

**Predictors of Receptive Language Performance**

**MSEL Receptive Language Scale.** Results of the regression analysis are presented in Table 8. The variables were entered separately into the regression model in the following order: age at arrival, height, RJA, IJA and BR. The overall model accounted for 29% of the variance in receptive language scores ($r^2 = .29$ $p = .001$). The most significant predictor of receptive language scores was RJA ($\beta = .53$, $p = .001$), which provided 22% unique variance after the contribution of age and height, which together accounted for less than 1% of the total variance. The only other predictor was IJA ($\beta$ = .30, $p$ = .01), which contributed another 7% unique variance in receptive language scores.

**Predictors of Expressive Language Performance**

**MSEL Expressive Language Scale.** Results of the regression are presented in Table 9. The variables were entered in the following order: age at arrival, height, RJA, IJA, and BR. The overall model accounted for 16% of the total variance in expressive language scores ($r^2$ = .16, $p$ = .01). The only significant predictor of expressive language scores was RJA ($\beta$ = .50, $p$ = .01), which contributed 14% variance after the contribution of age and height, which together accounted for less than 1% of the total variance. The variable IJA approached significance ($\beta$ = .21, $p$ = .10), contributing another 3% variance in expressive language scores.

**MCDI Words Produced.** Results of the regression are presented in Table 10. The variables were entered in the following order: age at arrival, height, RJA, IJA, and BR. The overall model accounted for 41% of the variance in the MCDI Words Produced scores ($r^2$ = .41, $p$ = .001) and indicated that age at arrival ($\beta$ = .40, $p$ = .01) contributed 36% variance in the first step. The only other significant predictor was IJA ($\beta$ = .21, $p$ = .05), which accounted for 3% additional variance in vocabulary size.

**Predictors of Language Performance: Subgroup With Birth Weight Available**

For the subgroup of 54 children with known birth weights, the variable of height was replaced with birth weight because height was found to be non-significant in the previous analysis. The regressions indicated that birth weight was not a significant contributor to language performance at 6 months post arrival. See Tables 8 through10 for regression results organized by language skill. The regression model for the subgroup indicated that for the Expressive Language scale, both RJA ($\beta = .53$, $p = .01$), and IJA ($\beta = .28$, $p = .04$) were significant predictors.

**Age at Arrival**

An ANOVA tested the hypothesis that children adopted before 15 months of age would have higher language outcomes than children adopted after 15 months of age. No significant difference was found between groups on either Expressive ($F = .17$, $p = .68$) or Receptive ($F = 2.71$, $p = .10$) language scores. See Table 11.

**Low Language Competence and Initial Social Communication Status**

Finally, the data were analyzed to test the hypothesis that children performing lower on language outcome measures at 6 months post arrival would be distinguishable by their RJA and IJA scores at arrival. The MANOVA revealed no significant differences for any of the groups (see Table 12). However an effect approaching significance was found for vocabulary using the Wilks' λ test for significance, $F = 2.3$, $p = .09$. A test of between subjects effects showed a significant effect of BR on vocabulary, $F = .1$, $p =.02$.

**Summary**

**Predictors of language performance at 6 months post arrival.** The analyses revealed that joint attention skills were predictive of expressive and receptive language scores outcomes at 6 months post arrival, but that there was no association between language scores and behavior regulation. Specifically, receptive language scores were predicted primarily by RJA and secondly by IJA. Expressive language scores were predicted by RJA, while IJA contributed to expressive language outcomes, approaching significance. Vocabulary size was predicted by age at arrival and IJA. The analysis also considered the contribution of birth weight and height at arrival, which are growth factors reflecting the quality of pre-adoptive care (such as pre-natal care, malnutrition and neglect). However, neither of these contributed to the variance in language performance in this sample.

**Low language competence and social communication.** These analyses found that RJA and IJA performance at 6 months post arrival did not distinguish between children with higher and lower language competence when they were divided along cut-off scores. Children adopted at 15 months of age and later also did not differ in language performance in comparison to children adopted before 15 months of age, when divided by this cut-off age.

## Discussion

This study examined the influence of risk factors including social communication status at arrival, birth weight, height at arrival, and age at arrival on early language skills in infants and toddlers recently adopted from Eastern European institutional care. The results confirmed the hypothesis that RJA and IJA skills measured at adoption would be predictive of language outcomes 6 months later. These findings are consistent with previous research suggesting a positive predictive relationship between responding and initiating joint attention skills and receptive and expressive language outcomes (Morales, et al., 2000; Morales et al., 1998; Mundy & Gomes, 1998; Mundy et al., 1990; Mundy et al., 1995; Mundy et al., 2007; Watt et al., 2006).

**Overall Language Performance**

The children's mean receptive and expressive language scores on the MSEL were within 1 standard deviation of the mean of the standardization sample after only 6 months of exposure to English. Earlier studies of language acquisition in this population estimated the prevalence of language delays in this population to be as high as 22% at age 2 years (Glennen, 2007). In the present study, between 16 and 19% of children were performing below the $20^{th}$ percentile for the peer group on at least one language measure 6 months after arrival. This is a positive finding, considering that children were only beginning to acquire English, and that outcomes could improve as they age and their linguistic abilities mature. This finding also seems to echo earlier research that many young children's language is resilient to the effects associated with institutional care. However, this should be interpreted with caution because 20% is a substantial number of children still at risk for language delays. The children in this group had spent their lives in institutional care, and although parent reports indicated that pre-adoptive care was fair to good as a whole, many children in this sample had heights and birth weights that were 2 standard deviations below the mean. Height has been associated with poorer developmental outcomes including language in children reared in institutions, and low birth weight is a risk factor for language delays. Therefore, it was hypothesized that birth weight and height would be associated with lower language in this sample. However, there was no association found between height and weight and language outcomes in the present study. This finding departs from some earlier research results showing associations between low birth weight and height and language outcomes.

Results also demonstrated that boys performed lower than girls in expressive but not receptive language at 6 months post arrival. There is a substantial body of research documenting that girls have better linguistic abilities than boys at young ages (Fenson et al., 1994; Galsworthy et al., 2000), possibly due to different rates of brain maturation for girls than boys (Bornstein, Hahn & Haynes, 2005).

**Receptive Language**

This study used multiple regression analysis to understand the contribution of initial social communication status and other risk factors to language outcomes. As expected, the RJA and IJA were significant contributors to MSEL Receptive Language score scores at 6 months post arrival, and RJA made the greatest contribution to the variance in receptive language performance. This is consistent with findings in the research literature that demonstrated a relationship between RJA and IJA and receptive language in typical children (Mundy et al., 1995; Mundy et al., 2007) and children with low birth weight (Ulvund & Smith, 1996). It was hypothesized that age at arrival would predict receptive language scores at 6 months post-arrival, but age did not contribute any unique variance to receptive language scores, as shown in Table 8. This finding was surprising, given the previous research demonstrating an association between age and language outcomes. As discussed above, 20% of children in this sample were performing below the 20th percentile in receptive language, which is comparable with previously reported rates of language delay for this population (Glennen, 2007). However, age was not a predictor of receptive language outcomes. It is worth noting that, according to parent reports, the children in this sample came from institutions where they received fair to good pre-adoptive care, while children in Croft et al. (2007) and other studies where age was associated with language outcomes had experienced substantial social and physical deprivation.

Height and birth weight also did not contribute to language outcomes at 6 months post arrival, although 40% of children were low birth weight and 13% had heights below 2 standard deviations. These findings depart from some earlier research findings.

**Expressive Language**

The results of the analysis showed that RJA was the most significant predictor of the MSEL Expressive Language score at 6 months post arrival, and that the contribution of IJA approached significance. However, this contribution was small (3% variance). In the analysis of the subgroup ($n$ = 54), IJA emerged as a significant contributor to expressive language scores, but still contributed a small 5% variance. This confirmed the study hypothesis that RJA and IJA skills would predict expressive language outcomes at 6 months post arrival. Together with the results of the vocabulary regression, this finding reflects a trend that IJA positively predicted expressive language abilities at 6 months post arrival. As with the receptive outcomes, age, height and weight did not predict performance on the MSEL Expressive Language score.

**Vocabulary**

As expected, the regression analysis showed that age at arrival accounted for the majority of the variation in vocabulary size in this sample ($n = 61$). This result is different from that found with the expressive and receptive language scores. However, the difference might be explained by the way the variables were measured and by considering the previous research in vocabulary acquisition in this population. The expressive and receptive language outcomes in this sample were measured using age-adjusted t-scores, while the vocabulary outcome was a count of total words produced. Previous research demonstrated that older toddlers acquired words at a more accelerated pace than children adopted at younger ages (Glennen, 2002a).

Initiating joint attention also contributed significantly to vocabulary size at 6 months post arrival, although it represented only 3% of the variance after the contribution of age. This is supported by the research literature, which has demonstrated relationships between IJA and expressive language in other populations of children (Mundy et al., 1990; Mundy et al., 2007; Watt et al., 2006). However, the size of the predictive relationship was smaller in this study than in previous research. For instance, Watt et al. demonstrated that the predictive correlation between acts for joint attention and inventory of words at around 24 months of age was .42 ($p < .001$), and Mundy et al. (2007) demonstrated a predictive correlation of .26 ($p < .05$) between IJA at 18 months of age and overall MCDI expressive scores at 24 months of age.

## Age at Arrival

The next hypothesis was that children adopted by 15 months of age ($n$ = 29) would outperform children adopted after 15 months of age ($n$ = 32) on receptive and expressive language scores. However, the analysis showed that there was no significant difference between the two groups. This finding is similar to that described by Croft et al. (2007), who found no statistically significant differences in the language performance of children adopted after 6 months of institutional care when children's language skills were assessed in later childhood. However, no child in the present study had an age of adoption younger than 6 months, precluding direct comparison with Croft et al.'s study.

The failure to find differences between the groups of younger and older children in the present study could also be due to a lack of variability in the age of children in the sample: the mean age of the early-adopted group was 13 months at arrival, and the mean age of the later adopted group was 20 months at arrival. The majority of children in the study may have been too close in age, representing a more homogeneous sample than that of other studies: 46 out of the 61 children (75%) were between 12 and 24 months of age at arrival.

## Low Competence

Finally, it was hypothesized that children with low competence in language would be distinguished by their RJA and IJA skills at arrival. In the preliminary analysis, children in the HV group did produce proportionately more IJA and BR initiations, and a greater range of initiations. Similarly, children in the HR group produced a greater number of higher-level initiations than children in the LR group. However, when all variables were taken into account by the multivariate analysis, no significant difference was found for any variable. There could be many explanations for this finding. First, many children in both groups produced no initiations at all. Also, the groups were not evenly distributed, reducing the robustness of the statistical analyses.: There were 10 and 12 children in the lower-competence HV and HR groups, respectively, and 49 and 51 children in the higher-competence groups.

**Behavior Regulation**

As expected, the data analysis found that behavior regulation requests were not predictive of receptive and expressive language scores or vocabulary size, demonstrating that not all preverbal gestural communication is predictive of later expressive language performance. Language outcomes were predicted only by RJA and IJA skills. As shown in the preliminary analysis, RJA and BR were correlates. However IJA and BR were not related. This is an interesting finding because IJA and IBR use the same gestures, but have different communicative intents. This finding is in line with assertions put forth in the literature by Mundy et al. (2007) that joint attention and behavior regulation bids, although gesturally similar, reflect different cognitive processes. It also suggests that social motivation, and not gesture development, may be the component of joint attention that contributes to language development.

The preliminary analysis also indicated that children produced five times as many behavior regulation requests as joint attention initiations. In typical children of this age, behavior regulation requests make up less than half of symbolic communication acts (Wetherby & Prizant, 1993). There are many possible explanations for why children in this sample may be using proportionately more BR acts than IJA acts. For instance, pre-adoptive experience or social motivation may have an influence. Children may be less socially motivated if they were not reinforced for their early attempts to use joint attention. If children were left to compete for resources or attention, they may have learned to be assertive in order to have their needs met. Alternatively, executive functioning differences may have resulted in a higher proportion of BR acts. For example, some children who experienced institutional deprivation have a lower capacity to inhibit impulses, which may also result in higher rates of BR acts (Behen et al., 2008; Chugani et al., 2001). Future research could explore these possible contributors to behavior regulation.

It should also be stated that the way the BR and IJA variables were measured and described in this study could have contributed to the unusually high number of BR requests. For instance, an act was considered behavior regulation whenever a child used a reach, a point or a push to request activation of an object; an act was considered initiating joint attention if it the child pointed or reached to share interest in an object. However, when a child uses behavior regulation acts to request objects or activities, joint attention could be embedded in this act.

**Limitations and Future Directions**

This study includes a representative sample of children adopted from Eastern Europe into the state of Minnesota, but is limited to some extent by the number of children who had incomplete data sets. Because not all children had birth weights, this reduced the number in some of the analyses to 54 participants, possibly weakening the statistical power of these analyses. In addition, the majority of the children in the sample were between 12 and 24 months of age. This could have contributed to the finding that children adopted at older ages did not differ significantly from children adopted at younger ages. Also, when children were divided into higher and lower performance groups, the number of participants in each group was not balanced. The majority of participants were categorized into the higher-performance groups (between 43 and 51 participants), while the lower performance groups had between 4 and 10 participants.

This study could also have been limited by aspects of the study design. One consideration is the way the joint attention and behavior regulation variables were measured. As already discussed, there may have been overlap between some variables (e.g. joint attention acts may have been embedded in behavior regulation requests). For example, a child may exchange looks with a social partner and point to a toy both to communicate interest and to request the toy. There may be more sensitive ways to measure joint attention variables, for instance, by distinguishing between distal and proximal gestures, which emerge at different points in development. Also, the assessments offered only a snapshot of children's abilities at one brief point in time. Their performance could have been influenced by unfamiliarity with the tester or the setting, anxiety, or other aspects of the testing environment. Future studies could include more extended observations of children's preverbal communication skills in more naturalistic environments.

Another possible limitation stemming from the study design is the definition of "low" performance or language competence. It is problematic to categorize children as lower competence after only 6 months exposure to English. Although the joint attention variables did predict language performance at 6 months, language outcomes at 1 or 2 years post arrival might look different, as children grow in their knowledge and experience with the language. Children's English language abilities are only emerging at 6 months post arrival, and previous studies have demonstrated that it takes children of this age up to 2 years to catch up to the language abilities of their peers. Children's competence in their native language was also unknown. Future studies could attempt to get information about children's language skills before adoption. Longitudinal studies could be designed to study the relationship between preverbal communication skills at arrival and language outcomes at different ages. Other future work could include a controlled intervention study aimed at promoting children's preverbal and verbal skills.

**Conclusion and Implications.** Social communication status measured at arrival and age at adoption were significant risk factors that predicted language outcomes in children from institutional care at 6 months post-arrival. Not all preverbal communication skills were predictive of language outcomes. Children who were using gestures such as pointing and reaching, but who were not using these as a means to communicate social interest and invite social interaction may still have been at risk for social communication and language delays. Children who were adopted at later ages and children who used fewer RJA and IJA bids at arrival were more likely to demonstrate slower language development at 6 months post arrival.

Previous studies have demonstrated that children who performed lower on language assessments relative to their peers a few months post adoption continued to have delays after a year in the adoptive home, and that children performing low on assessments of nonverbal and preverbal skills within a few months of adoption are at risk for language delays at age 2 years (Glennen, 2007). The strength of the current study is that it focused on children's social communication skills upon arrival, and demonstrated that these skills were predictive of language outcomes after 6 months. If measurements of social communication skills at arrival can be used to identify children who are at risk for language delays prior to the development of spoken language, there is increased likelihood that professionals can intervene and provide children and their families with additional language support to promote their developing language skills.

It is likely that only screening for social communication skills at arrival would miss some children who will not develop language to chronological age expectations. The regression models demonstrated that IJA and RJA contributed unique variance to language outcomes above the contribution of age. However, the total variance accounted for in these analyses was only between 16 and 41% of the total variance in language outcomes. This means that some other factor not accounted for by this analysis contributes significantly to language outcomes in this population. Nevertheless, it is clear that initial social communication status is a significant contributor to language abilities 6 months later, and should be considered in the evaluation of newly-arrived children.

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*Appendix*

Table 1. *Participants' Age, Duration of Institutional Care and Physical Growth at Arrival*

| | Entire Sample (N = 61) | | | | Subgroup with Birth Weights (N = 54) | | | |
|---|---|---|---|---|---|---|---|---|
| Measurement | M | SD | Min | Max | M | SD | Min | Max |
| Age at first visit (months) | 16.9 | 5.1 | 7.5 | 32.1 | 16.9 | 5.1 | 7.53 | 32.1 |
| Months in institutional care | 13.6 | 5.3 | 5.0 | 32.1 | 13.4 | 5.4 | 5.0 | 32.1 |
| Birth weight (kg) | 2.3 | .7 | 1.3 | 4.5 | 2.3 | .7 | 1.3 | 4.5 |
| Height at arrival (z-score) | -1.0 | .9 | -3.6 | 1.0 | -1.1 | .9 | -3.6 | .5 |

Note: Birth weight data was not available for the entire sample. A subgroup was created to test the hypothesis that birth weight would contribute to language scores at 6 months post arrival. The seven children who are not represented in the subgroup had a mean age of 16.9 (*sd* = 5.8, range = 8.6-27.0), mean duration of institutional care of 14.6 months (*sd* = 4.8, range = 8.6-24.0) and a mean height z-score of -7.8 (*sd* = 1.0, range = -2.3-1.0).

*Appendix*

Table 2. *ESCS Variables and Measures Used in Analysis*

| ESCS Variable | Description | Measure |
|---|---|---|
| Responds to Joint Attention (RJA) | Number of times child turns eyes or head to follow the point of the tester and looks beyond the end of the tester's finger. | Percentage of trials correct out of opportunities presented. |
| Initiates Joint Attention (IJA) | Number of times child does any of the following:<br>• points to active toy, pictures in a book or wall posters (with or without eye contact)<br>• raises active toy to tester's face to show object (not to request activation) | Total number of times child does any of the described actions at any time during the testing session. |
| Behavior Regulation (BR) | Number of times child does any of the following with or without eye contact:<br>• pushes object toward or holds object out to tester<br>• extends index finger to indicate desired inactive object or event | Total number of times child does any of the described actions at any time during the testing session. |

Note: Variable names, descriptions and measures in this table adapted from Mundy et al. (2003).

*Appendix*

Table 3. *Initial Assessment Results at Arrival*

| | Entire Sample | | | | | Subgroup with Birth Weights | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Measure | N | M | SD | Min | Max | N | M | SD | Min | Max |
| ESCS | | | | | | | | | | |
| RJA Ratio (% correct) | 61 | 48.6 | 39.3 | 0.0 | 100.0 | 54 | 48.5 | 40.1 | 0.0 | 100.0 |
| IJA (total number) | 61 | 1.5 | 2.0 | 0.0 | 8.0 | 54 | 1.4 | 2.0 | 0.0 | 8.0 |
| BR (total number) | 61 | 6.9 | 6.4 | 0.0 | 25.0 | 54 | 7.1 | 6.4 | 0.0 | 25.0 |
| MSEL | | | | | | | | | | |
| Expressive Language (t-score) | 61 | 42.4 | 8.8 | 22.0 | 62.0 | 54 | 42.2 | 9.2 | 22.0 | 62.0 |
| Receptive Language (t-score) | 61 | 41.3 | 10.4 | 20.0 | 64.0 | 54 | 40.3 | 10.1 | 20.0 | 64.0 |
| MCDI | | | | | | | | | | |
| Words Produced (total number) | 61 | 75.9 | 84.2 | 0.0 | 439.0 | 54 | 74.2 | 87.3 | 0.0 | 439.0 |

Note: ESCS = Early Social Communication Scales. RJA = responding joint attention; IJA = initiating joint attention; BR = initiating behavior regulation. MSEL = Mullen Scales of Early Learning. MCDI = MacArthur Communicative Development Inventory. Birth weight data was not available for the entire sample. A subgroup was created to test the hypothesis that birth weight would contribute to language scores at 6 months post arrival.

*Appendix*

Table 4. *High and Low Expressive and Receptive Language Groups*

| | MSEL Expressive | | MSEL Receptive | |
|---|---|---|---|---|
| | Low (LE) | Higher (HE) | Low (LR) | Higher (HR) |
| N | 10 | 51 | 12 | 49 |
| M | 29.6 | 44.9 | 27.8 | 44.6 |
| Range | 22-35 | 36-62 | 20-32 | 33-64 |
| SD | 3.8 | 7.1 | 4.0 | 8.7 |

Note: MSEL = Mullen Scales of Early Learning (administered at 6 months post arrival). Expressive and Receptive scores are t-scores. Low performance = below 20$^{th}$ percentile of sample group. Expressive Language 20$^{th}$ percentile score =35.5; Receptive Language 20$^{th}$ percentile score = 32.6.

*Appendix*

Table 5. *High and Low Vocabulary Groups*

MCDI Words Produced

| | Low (LV) | | | Higher (HV) | | |
|---|---|---|---|---|---|---|
| N | | 10 | | | 51 | |
| Age at arrival | N | M | SD | N | M | SD |
| 0-12 months | 4 | 15.0 | 13.0 | 7 | 38.4 | 60.5 |
| 13-18 months | 4 | 10.3 | 4.2 | 30 | 69.6 | 45.8 |
| 19-24 months | 1 | 1.0 | -- | 9 | 111.0 | 129.0 |
| 25-30 months | 1 | 25.0 | -- | 4 | 190.8 | 34.7 |
| 30+ months | -- | -- | -- | 1 | 374.0 | -- |

Note: MCDI Words Produced = total number of words produced as indicated by parents using MacArthur Communicative Development Inventory. High and low performance was determined using preliminary clinical guidelines charts for at-risk language development in internationally adopted children (Glennen, 2002b.) The mid-range scores were used as cut-offs between high and low groups.

*Appendix*

Table 6. *High and Low Age Groups*

| | | Low Age (LA) | High Age (HA) |
|---|---|---|---|
| N | | 29 | 32 |
| Age at arrival (months) | | | |
| | M | 13.0 | 20.5 |
| | Range | 7.5-16.0 | 16.1-32.1 |
| | SD | 2.5 | 4.2 |
| MSEL Expressive Scale | | | |
| | M | 44.3 | 40.7 |
| | Range | 30.0-62.0 | 22.0-62.0 |
| | SD | 7.8 | 9.4 |
| MSEL Receptive Scale | | | |
| | M | 41.9 | 40.8 |
| | Range | 30.0-64.0 | 20.0-63.0 |
| | SD | 10.0 | 10.9 |

Note: MSEL = Mullen Scales of Early Learning (administered at 6 months post arrival). Receptive and Expressive scores are t-scores. Children were assigned to the Low Age (LA) group if they were 15 months at arrival and the High Age (HA) group if they were older than 15 months at arrival.

*Appendix*

Table 7. *Correlations Among Risk Factors*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. RJA | -- | | | | | |
| 2. IJA | .28 | -- | | | | |
| 3. BR | .54** | .18 | -- | | | |
| 4. Age at arrival | .62** | .25 | .66** | -- | | |
| 5. Birth Weight | -.16 | -.01 | .07 | -.12 | -- | |
| 6. Height at arrival | .09 | -.02 | -.07 | -.06 | -.04 | -- |

**. Correlation is significant at the 0.01 level (2-tailed).
Corrected for Type I error using Bonferroni method.

*Appendix*

Table 8. *Stepwise Regressions of MSEL Receptive Language Score on Risk Factors*.

| | Entire Group (N = 61) | | | | | | Subgroup (N =54) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE (B) | $\beta$ | t | Sig (*p*) | | B | SE (B) | $\beta$ | t | Sig (*p*) |
| Model 5 | | | | | | Model 5 | | | | | |
| Age | -.82 | .33 | -.40 | -2.50 | .001 | Age | -.95 | .30 | -.48 | -3.13 | .01 |
| Height | .81 | 1.27 | .07 | .64 | .53 | Weight | -1.30 | 1.70 | -.09 | -.76 | .45 |
| RJA | 15.20 | 3.71 | .57 | 4.10 | .001 | RJA | 17.15 | 3.40 | .69 | 5.06 | .001 |
| IJA | 1.58 | .59 | .30 | 2.67 | .01 | IJA | 1.51 | .56 | .30 | 2.68 | .01 |
| BR | .21 | .25 | .13 | .84 | .41 | BR | .16 | .23 | .10 | .69 | .50 |

Note: Entire Group: variables entered = Age, Height, RJA, IJA, BR. Model 1 $R^2$ = -.01 *(p* = .53) . Model 2 $R^2$ = -.01 *(p* = .49). Model 3 $R^2$ = .22 *(p* = .001), Model 4 $R^2$ = .29 *(p* < .001), Model 5 $R^2$ = .29 *(p* < .001). Subgroup: variables entered = Age, Weight, RJA, IJA, BR. Model 1 $R^2$ = -.01 *(p* = .58). Model 2 $R^2$ = -.02 *(p* = .61). Model 3$R^2$ = .33 *(p* = .001), Model 4 $R^2$ = .41 *(p* = .001), Model 5 $R^2$ = .40 *(p* = .001). RJA and IJA = responding joint attention and initiating joint attention (measured at arrival using Early Social Communication Scales). Age = age at arrival. MSEL = Mullen Scales of Early Learning (administered at 6 months post arrival).

*Appendix*

Table 9. *Stepwise Regression of MSEL Expressive Language Score on Risk Factors*

| | Entire Group (N = 61) | | | | | | Subgroup (N =54) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE (B) | $\beta$ | t | Sig ($p$) | | B | SE (B) | $\beta$ | t | Sig ($p$) |
| Model 5 | | | | | | Model 5 | | | | | |
| Age | -.77 | .27 | -.45 | -2.89 | .01 | Age | -.81 | .32 | -.45 | -2.55 | .01 |
| Height | -.88 | 1.17 | -.09 | -.76 | .45 | Weight | .26 | 1.78 | .02 | .15 | .89 |
| RJA | 11.07 | 3.73 | .50 | 2.97 | .01 | RJA | 12.03 | 3.77 | .53 | 3.19 | .01 |
| IJA | .92 | .55 | .21 | 1.67 | .10 | IJA | 1.28 | .60 | .28 | 2.14 | .04 |
| BR | .02 | .12 | .02 | .16 | .87 | BR | -.16 | .24 | -.12 | -.67 | .50 |

Note: Entire Group: variables entered = Age, Height, RJA, IJA, BR. Model 1 $R^2$ = -.01 ($p$ = .57), Model 2 $R^2$ = -.03 ($p$ = .83), Model 3 $R^2$ = .14 ($p$ = .01), Model 4 $R^2$ = .17 ($p$ = .01), Model 5 $R^2$ = .16 ($p$ = .01). Subgroup: variables entered = Age, Weight, RJA, IJA, BR. Model 1 $R^2$ = -.01 ($p$ = .38), Model 2 $R^2$ = -.02 ($p$ = .66), Model 3 $R^2$ = .17 ($p$ = .01), Model 4 $R^2$ = .22 ($p$ = .01), Model 5 $R^2$ = .21 ($p$ = .01). RJA and IJA = responding joint attention and initiating joint attention (measured at arrival using Early Social Communication Scales). Age = age at arrival. MSEL = Mullen Scales of Early Learning (administered at 6 months post arrival).

*Appendix*

Table 10. *Stepwise Regression of MCDI Words Produced Score on Risk Factors*

| | Entire Group (N = 61) | | | | | | Subgroup (N =54) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE (B) | $\beta$ | t | Sig (*p*) | | B | SE (B) | $\beta$ | t | Sig (*p*) |
| Model 5 | | | | | | Model 5 | | | | | |
| Age | 6.44 | 2.12 | .40 | 3.03 | .01 | Age | 7.39 | 2.69 | .43 | 2.75 | .01 |
| Height | -3.17 | 9.29 | -.03 | -.34 | .73 | Weight | 7.20 | 15.01 | .05 | .48 | .63 |
| RJA | 42.58 | 29.69 | .20 | 1.43 | .16 | RJA | 57.40 | 31.76 | .26 | 1.81 | .08 |
| IJA | 8.88 | 4.36 | .21 | 2.03 | .05 | IJA | 9.10 | 5.04 | .21 | 1.81 | .08 |
| BR | .71 | .92 | .09 | .78 | .44 | BR | -1.31 | 2.05 | -.10 | -.64 | .53 |

Note: Entire Group: variables entered = Age, Height, RJA, IJA, BR. Model 1 $R^2$ = .36 (*p* = .001), Model 2 $R^2$ = .35 (*p* = .001), Model 3 $R^2$ = .39 (*p* = .001), Model 4 $R^2$ = .42 (*p* = .001), Model 5 $R^2$ = .41 (*p* = .001). Subgroup: variables entered = Age, Weight, RJA, IJA, BR. Model 1 $R^2$ = .33 (*p* = .001). Model 2 $R^2$ = .32 (*p* = .001), Model 3 $R^2$ = .36 (*p* = .001), Model 4 $R^2$ = .39 (*p* = .001), Model 5 $R^2$ = .38 (*p* = .001). RJA and IJA = responding and initiating joint attention (measured at arrival using Early Social Communication Scales). Age = age at arrival. MCDI Words Produced MacArthur Communicative Development Inventory estimate of vocabulary size completed by parents at the 6 month assessment.

*Appendix*

Table 11. *Analysis of Variance for Language Differences Between Children Adopted Before and After 15 months*

| Variable | SS | DF | F | Sig (*p*) |
|---|---|---|---|---|
| MSEL Receptive | 18.92 | 1 | .17 | .68 |
| MSEL Expressive | 203.49 | 1 | 2.71 | .10 |

Note: MSEL = Mullen Scales of Early Learning (administered at 6 months post arrival). Expressive and Receptive scores are t-scores.

*Appendix*

Table 12. *Multivariate Analysis of Variance for Differences Between High and Low Language Groups on Joint Attention*

| High and Low Vocabulary Groups | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | LV Mean | LV Range | HV Mean | HV Range | SS | DF | MS | F | Sig (p) |
| RJA | .2 | 0-1 | .5 | 0-1 | .01 | 1 | .01 | .08 | .79 |
| IJA | .3 | 0-1 | 1.8 | 0-8 | 7.8 | 1 | 2.5 | .68 | .41 |
| BR | 2.4 | 0-6 | 7.8 | 0-25 | 129.07 | 1 | 129.07 | 5.8 | .02 |

| High and Low Expressive Groups | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | LE Mean | LE Range | HE Mean | HE Range | SS | DF | MS | F | Sig (p) |
| RJA | .4 | 0-1 | .5 | 0-1 | .29 | 1 | .29 | 3.66 | .06 |
| IJA | .8 | 0-6 | 1.7 | 0-8 | 1.0 | 1 | 1.0 | .29 | .60 |
| BR | 7.5 | 0-18 | 6.8 | 0-25 | .24 | 1 | .24 | .01 | .92 |

| High and Low Receptive Groups | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | LR Mean | LR Range | HR Mean | HR Range | SS | DF | MS | F | Sig (p) |
| RJA | .2 | 0-.8 | .6 | 0-1 | .19 | 1 | .19 | 2.4 | .13 |
| IJA | .3 | 0-1 | 1.8 | 0-8 | 1.05 | 1 | 1.0. | .29 | .59 |
| BR | 5.8 | 0-19 | 7.2 | 0-25 | 7.0 | 1 | 7.0 | .32 | .58 |