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Developmental Outcomes of Internationally Adopted Children

Janet A. Welsh and
Prevention Research Center for the Promotion of Human Development, The Pennsylvania State University, 135 E. Nittany Avenue, Suite 402, State College, PA, 16801

Andres G. Viana
Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, 2500 N. State Street, Jackson, MS 39216.

Abstract

This study followed the development of a sample of 106 (67 girls) internationally adopted children over a period of 18 months. Children were adopted from five birth regions, including China, Korea, Latin America, Eastern Europe, and other Asian countries. Mean age at adoption was 11 months. Mothers completed the Ages and Stages Questionnaire (ASQ) at 6, 12, and 24 months post-adoption, assessing children's gross and fine motor, communicative, personal-social, and problem solving skills. Results revealed that the sample as a whole demonstrated linear improvement over time in most developmental domains, but children with initially low scores remained significantly lower than other children at the 18-month follow-up. At the first time point, communication was the domain where children most commonly experienced delays. Children with medical problems had significantly lower developmental scores than those without medical diagnoses. ASQ scores were unrelated to age at adoption, but significant differences by birth country region were found. Across most domains, children adopted from Eastern Europe showed generally lower scores than children adopted from other birth regions.

Over the past two decades, an increasing number of American families have chosen to adopt internationally. The resulting sharp rise in the number of internationally adopted (IA) children has also sparked interest in their developmental outcomes. Prior to 1990 most IA children were adopted as infants from Korea, where high-quality foster homes and access to good medical care were often available; thus developmental outcomes of these children were generally favorable (Dalen, Hjern, Lindblad, Odenstad, Ramussen, & Vinnerljung, 2008; Odenstad, Hjern, Lindblad, Ramussen, Vinnerljung, & Dalen, 2008; Stams, Juffer, Rispens, & Hoksbergen, 2000). In the past 20 years, however, the demographics of IA children has changed, with many children reared in orphanages or other institutional environments prior to adoption, and therefore at risk for a host of developmental, behavioral, and medical difficulties.

Recent research on developmental outcomes of IA children typically revealed that those adopted from institutional care settings demonstrated significant, global delays at the time of their arrival in their adoptive families, but experienced a period of rapid catch-up growth following adoption (Ames, 1997; Gunnar, Bruce, & Grotevant, 2004; Morison, Ames & Chisholm, 1995; Palacios, Roman & Camacho, 2010; Rutter, 1998; Rutter, Andersen-Wood, Beckett, Bredenkamp, Castle, & Groothues, 1999). For example, the rate of recovery of physical growth of adopted children from institutionalized settings often exceeds the rate of

Correspondence concerning this article should be addressed to Janet A. Welsh, Prevention Research Center for the Promotion of Human Development, The Pennsylvania State University, 135 E. Nittany Avenue, Suite 402, State College, PA 16801. Phone: (814) 865-3691. Fax: (814) 865-6004. jaw900@psu.edu..

non-adopted peers (Gunnar et al., 2004; Johnson, in press), and gross cognitive and language deficits also show remarkable and rapid (although not necessarily complete) recovery (e.g., Rutter & ERA Study Team, 1998). Further, research has shown that recovery may also be associated with degree of initial impairment. In a sample of Romanian adoptees, cognitive improvement was found only for those who showed the greatest impairment initially (Beckett, Maughan, Rutter, Castle, & Colvert, 2006). Despite these generally consistent findings of impressive developmental recovery shown by most children following adoption, not all children recover, and not all recovery is complete. Some children demonstrate persistent, and perhaps even permanent, deficits in one or more developmental domains (Gunnar & van Dulmen, 2007; LeMare & Audet, 2002; Rutter et al., 2009). As a result, there is a need for research on factors associated with developmental recovery of IA children, so that families and professionals working with these children can be guided toward the intervention services most likely to facilitate optimal adjustment. Therefore, the goal of the current study was to identify factors related to developmental recovery in a diverse sample of IA children.

Pre-adoptive Context: Birth Country and Preadoptive Experiences

One factor that may partially explain variability in developmental recovery is the child's birth country and associated differences in preadoptive experiences. Countries vary considerably in terms of the quality and type of care provided to children placed for adoption. Studies of IA children suggest that those who experience low-quality orphanage or other institutional caregiving prior to adoption show greater developmental deficits than those cared for in foster or other home-care settings. For example, Romanian children adopted in the 1990's generally experienced extreme deprivation prior to adoption and were almost uniformly found to have severe, global developmental deficits at the time of adoptive placement, as well as patterns of recovery suggesting a dose-response relationship between duration of institutional experience and degree of developmental catch-up (Ames, 1997; Castle, Groothues, Bredenkamp, Beckett, O'Connor & Rutter, 1999; Morison, Ames & Chisholm, 1995; O'Connor & Rutter, 2000; Rutter & the ERA study team, 1998). Children adopted from Russian and Chinese orphanages showed similar, if somewhat less severe, deficits and patterns of accelerated post-adoption development (Albers, Johnson, Hostetter, Iverson, & Miller, 1997; Miller & Hendrie, 2000). In a sample of IA children from Guatemala, orphanage-reared children were significantly more delayed in physical growth and cognitive development than those reared in foster care (Miller et al., 2005). Other studies comparing orphanage-reared and foster-care reared IA children have found less preadoptive adversity (Bruce, Tarullo, & Gunnar, 2009), lower rates of disorganized attachment (van Londen et al., 2007), and higher developmental scores (van Londen, Juffer & van IJzendoorn, 2007) in the foster care group.

Children are also placed for adoption in different countries for different reasons, which may have a direct bearing on their post-adoptive developmental adaptation. For example, children adopted from China are generally girls who have been abandoned by their birth families as a result of social policies that favor male children, while Korean children are placed largely because of social intolerance for single motherhood in Korea. By contrast, in Russia and other Eastern European countries, many children are abandoned or removed from their birth families due to poverty and social problems such as alcoholism. Indeed, exposure to abuse and neglect, and risk of prenatal alcohol exposure is higher for Russian and Eastern European adoptees than for other groups (Johnson, 2000; Miller, 2005). One study found that at the time of admission to the orphanage, Russian children had elevated rates of premature birth and perinatal difficulties relative to Russian norms (The St. Petersburg Orphanage Research Team, 2008), suggesting a biological risk confounded with the negative effects of institutional rearing that might be expected to impede post-adoption

recovery. Although comparative studies are few, existing data generally support the hypothesis that Eastern European adoptees are at higher risk for persistent developmental difficulties than children from other regions, including motor and cognitive problems (Pomerleau et al., 2005), attachment disturbances (O'Connor & Rutter, 2000), inattentive-overactive behavior (Kreppner, O'Connor, & Rutter, 2001; Miller, Chan, Tirella, & Perrin, 2009) and cognitive and academic deficits (Miller et al., 2009; Rutter et al., 2008). Palacios et al. (2010) studied a diverse group of IA children adopted by Spanish families and found that children from some birth countries (i.e., Romania and India) showed greater initial delays than those from others (i.e., China); however, there were no country-specific differences in children's rates of recovery.

By contrast, some Asian adoptees appear to be at relatively low risk for poor recovery. One study (Feigelman & Silverman, 1983) found significantly better social adjustment and academic achievement for Korean adoptees than for children adopted from Colombia or for domestic African American adoptees. Similarly, population-based studies in Sweden and the Netherlands found significantly superior cognitive outcomes for Korean adoptees relative to children adopted from other Asian countries (e.g., Thailand) and Latin America (Dalen et al., 2008; Kim, Shin & Carey, 1999; Lindblad et al., 2009; Odenstad et al., 2008). Low rates of parent-reported developmental problems have also been found among female Chinese adoptees, although history of abuse and neglect predicted more difficulties (Tan, 2009; Tan & Marfo, 2006). In their study of a large and diverse sample of IA children, the University of Minnesota International Adoption Project (IAP, 2002) found significantly lower rates of pre-adoptive risk factors such as premature birth, drug and alcohol exposure, and institutional rearing for children adopted from Asian than from Eastern European countries, which might explain some of the differences in post-adoption adjustment observed between these two groups.

Child Characteristics

A number of studies have found significant relations between adopted children's developmental trajectories and characteristics including age at adoption and special needs such as medical problems, although the findings are somewhat mixed. The effects of age at adoption have been examined in several subgroups of IA children and, in general, data indicate more favorable outcomes for early-placed children. In Romanian samples, degree of long-term developmental deficit was linearly related to duration of institutional care (Rutter et al., 1998). Even many years post-adoption, children continued to demonstrate significantly reduced recovery in multiple domains of functioning associated with duration of institutional experience (Kreppner et al., 2000; Morison et al., 1995; Morison & Ellwood, 2000; O'Connor et al., 2003; Rutter et al., 2001; Rutter et al., 2009). Similarly, Judge (2003) assessed young Russian adoptees with the Revised Denver Prescreening Developmental Questionnaire and found that later-placed adoptees showed less complete recovery in multiple developmental domains than children adopted at younger ages. This study found that degree of initial delay also predicted later recovery, with children who had more delays showing more incomplete catch-up. Although this study noted that many of the children in the sample had medical problems at the time of adoption, these were not examined in relation to developmental catch-up.

There is some support for the position that children classified as “special needs” prior to adoption due to specific medical conditions would experience less complete developmental recovery than children without medical problems. The International Adoption Project at the University of Minnesota (IAP, 2002) found that number of medical problems at arrival predicted behavioral and emotional problems in IA children, although they did not examine the role of medical problems in predicting developmental recovery.

Domain Specificity

Although many IA children arrive in their adoptive homes with global developmental deficits, there is some indication that certain domains are more profoundly and persistently affected than others. For example, while many IA children show significant delays in physical growth and motor development at the time of adoption, rapid and complete or nearly complete recovery in these domains for most children is often observed (Jacobs, Miller, & Tirella, 2010; Johnson, 2000; Miller, 2005; Rutter, 1998). In contrast, cognitive and socioemotional domains recover more slowly and in some cases may never recover completely. For instance, longitudinal studies of Romanian children found persistent deficits in IQ, attachment difficulties, and inattentive-overactive behavior (Kreppner et al., 2001; Rutter et al., 2008; O'Connor, & Rutter, 2000), particularly for children who had spent the longest periods in institutional care. Other studies have revealed high rates of persistent language delay in IA children, especially those who experienced institutional care prior to adoption (Glennen & Bright, 2005; Glennen & Masters, 2002; McGuinness & McGuinness, 1999). In the Judge (2003) study, language was the most persistently delayed of the developmental domains studied.

The literature reviewed above thus suggests that preadoptive context and some child characteristics are key pre-adoption determinants of the developmental trajectories of IA children, and that various aspects of developmental competence may be differentially affected. The goal of the current study was to report on multi-domain developmental trajectories of a diverse sample of contemporary international adoptees and to examine the role of preadoptive context (e.g., country of origin, orphanage vs. foster care) and child characteristics (age at adoption and medical problems) on IA children's development.

Based on prior research with international adoptees, we hypothesized that: (1) IA children would show significant improvements over time in all developmental domains; (2) different patterns of deficit and recovery would exist for distinct developmental domains, with more children initially showing delays in communication than in other domains; (3) IA children who demonstrated substantial developmental delays at the time of adoption would show significantly greater longitudinal improvement during the study period than children without substantial deficits at the time of placement; (4) IA children with medical problems, those adopted at older ages, and those living in orphanages prior to adoption would show greater and more persistent developmental delays than younger children, those without medical problems, and those cared for in foster homes prior to being adopted; and (5) regional differences in developmental outcomes would emerge, with children adopted from Asian countries having better outcomes than those adopted from Eastern Europe.

Method

Participants

One hundred and six mothers who adopted one child internationally participated in the study. The sample represented a subset of a larger sample of families participating in a longitudinal study of adjustment and development of IA children (see Viana & Welsh, 2010; Welsh, Viana, Petrill, & Mathias, 2008). Families were recruited through six partnering agencies specializing in international adoptions. Pre-adoption survey packets were mailed to all clientele who had accepted an international adoption referral during a one-year period. Two hundred and fifty-six families responded to the pre-adoptive survey, representing 21% of the eligible participants. Participating families were also mailed surveys 6 months, 12 months, and 24-months post-adoption. The 106 cases selected for inclusion in the current study were chosen because mothers had completed developmental measures at all three post-adoption time points, and because the adopted children were in the targeted age range

for the developmental measure used at all 3 waves (4-60 months). Mean age of the mothers was 40.16 years (*SD* = 4.93, age range = 27 – 54), 53.7% had incomes of $80,000 or more, and 77.3% had at least a college degree (48.1% had a graduate and/or professional degree). Fifty five percent of mothers had other children in addition to the adopted child, and 78.3 % were married. Of the 106 adopted children, 63.2% (*n* = 67) were female. The mean age for children at Time 1 (6 months post adoption), Time 2 (12 months post adoption) and Time 3 (24 months post adoption) were 17.6 months (*SD* = 5.86), 24.37 months (*SD* =6.02), and 36.73months (*SD* = 6.15), respectively. Thirty three percent of children were adopted from Korea (*n* = 35), 33% (*n* = 35) from China, 12.3% (*n* = 13) from Latin America; 11.3% (*n* = 12) from Eastern Europe (e.g., Russia; Kazakhstan; Georgia), and 8.5% (*n* = 9) from other Asian countries (e.g., Mongolia, India, Philippines). Country of origin information was missing for 2 children. Forty-five percent (*n* = 48) and 49.1% (*n* = 52) of children had been cared for in orphanages and foster care, respectively, prior to adoption. Information on environment prior to adoption was missing for 6 children (5.7%).

Measures

Mothers completed post-adoption surveys at Times 1, 2 and 3. Survey questions and constructs were derived from those used in previous studies (either adoption studies or, in the absence of these, studies from the broader child development literature) and identified as potentially relevant to adjustment outcomes of both children and parents. While the survey assessed a wide range of constructs, only those pertaining to this study are described here (for additional details on all constructs measured, see Viana & Welsh, 2010, and Welsh et al., 2008). Cronbach's alphas are reported when appropriate.

Pre-Adoptive Context and Child Characteristics—Parents provided information regarding their child's gender, age, and birth country. Additionally, parents indicated whether their children had resided in orphanages or foster care prior to adoption.

Child's Special Needs—Twenty four items asked parents to endorse in a “yes” or “no” format whether their adopted child currently suffered from any of a series of commonly reported medical problems in adoptees (Miller, 2005; e.g., heart birth defect, fetal alcohol syndrome, cleft lip/palate). Children with any medical diagnosis were classified as special needs (SN; *n* = 37 [34.9%]). Because of the dichotomous nature of these items, internal consistency is not reported.

***Ages and Stages Questionnaire* (ASQ; Squires, Potter, & Bricker, 1999)—**The ASQ is a 30-item parent-completed questionnaire designed to screen children for potential developmental delays during their first five years of life. The ASQ assesses development across five domains—communication (e.g., “When your child wants something, does she tell you by pointing to it?” α = .77, .54, and .47 at Time 1, Time 2, and Time 3, respectively[1]), fine motor (e.g., “Does your child make a mark on the paper with the tip of a crayon when trying to draw?;” α = .31, .40, and .72), gross motor (e.g., “Does your child climb on an object such as a chair to reach something he wants?;” α = .87, .53, and .78), problem-solving (e.g., “After you have shown her how, does your child try to get a small toy that is slightly out of reach by using a spoon, stick, or similar tool?;” α = .89, .45, and .85), and personal-social (e.g., “Does your child call herself ‘I’ or ‘me’ more often than her own name?;” α = .80, .37, and .66)—with forms available for different developmental levels

[1]The ASQ has 11 forms (4, 6, 8, 12, 16, 18, 20, 24, 30, 36, and 48 months) and five domains of interest per form, yielding a total of 55 Cronbach's alphas. For brevity sake, this and subsequent alphas correspond to the form that was most frequently administered in our sample (i.e., Time 1 = 16 months, Time 2 = 24 months, and Time 3 = 36 months). In general, results were consistent with alphas reported in Squires et al. (1999).

(e.g., 6-, 12-, 18-months). Parents are asked to rate on a 3-point scale (0 = "not yet," 5 = "sometimes," and 10 = "consistently demonstrates the skill") the extent to which the child shows mastery of a domain-specific skill. Scores for each domain range from 0–60. Squires and colleagues reported adequate internal consistency, a test-retest reliability of .94, and a 75% average sensitivity to developmental delays across forms (Squires, Bricker, & Potter, 1997).

Data Analysis

Analyses were conducted using SAS software, version 9.1.3 (SAS Institute, 2004). All outcomes were dimensional (developmental scores on each domain). Linear mixed model repeated measures analyses of variance (PROC MIXED) were used to determine predicted mean values at each assessment point (6 months, 12 months, and 24 months after the adoption) and to test between-group differences 24-months after the adoption. Time was included as a repeated factor. Predictors included: special needs status (none vs. any), child's environment prior to adoption (orphanage vs. foster care), birth country, and clinical status at first measurement (6 months; clinical vs. normal range for each developmental domain assessed). Age and gender, although initially intended to be included as predictors, failed to correlate with outcome variables. Therefore, these were not included in the models. Linear and quadratic time, time-by-birth country, time-by-environment prior to adoption, time-by-clinical status, and time-by-special needs status, were also included. Modeling of the data was also followed by backward trimming to identify the simplest and best-fitting model. Selection of the best covariance structure that accounted for within-subject correlation over time was determined by running each model with a different covariance structure and comparing models on the Akaike Information Criterion (AIC). For all models, an unstructured covariance matrix that allowed for correlation among measurement waves provided the best fit. All comparisons were planned and tests were two-sided. A p-value of less than 0.05 was considered for statistical significance.

Results

Completers versus non-completers

To examine potential sample bias due to attrition, mothers who completed all surveys (Time 1, Time 2, and Time 3) ($N = 106$) and those who dropped out after only completing the Time 1 survey ($N = 18$) were compared across parent and child demographic variables (i.e., maternal age, income, education, and prior children in the family; adopted child's gender, age, country of origin, and special needs status). No significant differences were found between completers and non-completers across any of the variables of interest. However, there was a trend ($p = .07$) for mothers who dropped out to be somewhat younger ($M = 37.67$ years, $SD = 6.85$) than those who completed all waves ($M = 40.16$ years, $SD = 4.93$). Thus, there was no evidence to suspect systematic sampling bias due to attrition.

Hypothesis # 1: IA children would show significant improvements over time in all developmental domains

Consistent with our first hypothesis, significant linear trends were found for communication, $F(1, 200) = 104.40$, $p < .01$, personal-social, $F(1, 201) = 66.66$, $p < .01$, gross motor, $F(1,198) = 19.70$, $p < .01$, and problem-solving skills, $F(1, 198) = 25.71$, $p < .01$. For gross-motor, the quadratic trend was also significant, $F(1, 198) = 4.14$, $p < .05$. No significant main effect for time was found for fine-motor skills. Therefore, for the sample as a whole, communication, personal-social, gross motor and problem-solving skills improved in a linear fashion, while gross-motor skills also improved in a quadratic, inverted U-shape,

fashion. The first hypothesis was generally supported, with the exception of fine motor skills which showed no significant improvements over time (see Table 1 for means and SDs).

Hypothesis # 2: Patterns of delay and recovery would vary by domain, with communication particularly affected at Time 1

In order to address this hypothesis, the proportion of children in the clinical versus nonclinical range for each developmental domain was computed at each time point. Consistent with our second hypothesis, at Time 1 the largest proportion of clinically significant delays was in communication skills, with 34% ($n = 36$) of IA children rated in the clinical range (see Table 2). However, mother reports showed that the number of children falling in the clinical range for communication delay dropped significantly across the study period, with 94.4% ($n = 34$) of the children initially in the clinical range at Time 1 rated in the normal range at Time 3. Regarding fine-motor skills, 100% of the children in the clinical range at Time 1 ($n = 15$) were rated in the normal range at Time 3. For gross-motor skills, 92.3% ($n = 12$ of 13) of children initially rated in the clinical range were rated in the normal range at Time 3. In the personal-social domain, 93.8% ($n = 15$ of 16) of children initially rated in the clinical range were rated in the normal range at Time 3. Finally, with respect to problem-solving skills, 100% of children rated in the clinical range at Time 1($n = 20$) were rated in the normal range at Time 3. There were six cases that scored in the clinical range for problem-solving skills at Time 3 who had not shown delays at Time 1 (see Table 2). Thus, the second hypothesis was supported.

Hypothesis # 3: IA children who demonstrated substantial developmental delays at Time 1 would show relatively greater improvement over time than children without substantial deficits at the time of placement

This hypothesis was not supported. Children with initial delays and those without delays improved at similar rates. No significant time-by-clinical status interactions were found for any of the developmental domains except for gross motor, where non-delayed children showed relatively accelerated growth ($F[1,231= 6.40$, $p <.01$]; all others *ns*).

Given this pattern of similar rates of developmental improvement over time, children with developmental delays in the clinical range at Time 1 continued to have developmental scores significantly lower than children who were initially less delayed. That is, the main effect for clinical status (clinical vs. nonclinical) was significant across the five developmental domains (communication: $F[1, 294] = 284.14$, $p < .01$; fine motor: $F[1, 285] = 89.67$, $p < .01$; gross motor: $F[1, 261] = 64.51$, $p < .01$; personal-social: $F[1, 288] = 124.37$, $p < .01$; problem-solving: $F[1, 256] = 176.59$, $p < .01$). Thus, children with clinically significant delays in communication, fine-motor, gross-motor, problem-solving, and personal-social skills were rated, on average across the study period, significantly lower than children initially in the normal range on these skills (see Table 3). The linear time effect was also significant across the five domains (communication: $F[1, 209] = 40.27$, $p < .01$; fine motor: $F[1, 205] = 8.74$, $p < .01$; gross motor: $F[1, 226] = 10.7$, $p < .01$; personal-social: $F[1, 196] = 42.35$, $p < .01$; problem-solving: $F[1, 193] = 13.06$, $p < .01$).

Hypothesis # 4: IA children with medical problems, those adopted at older ages, and those living in orphanages prior to adoption would show greater and more persistent developmental delays than younger children, those without medical problems, and those cared for in foster homes prior to being adopted

Because our preliminary analyses revealed child age to be uncorrelated with developmental scores in any domain, we did not include this variable in subsequent analyses. However, consistent with our fourth hypothesis, children with medical needs were rated, on average, significantly lower in communication, gross-motor, personal-social, and problem-solving

skills than children without medical needs (communication: $F[1, 85.8] = 5.83$, $p < .05$; gross-motor: $F[1, 88.5] = 4.94$, $p < .05$; personal-social: $F[1, 87] = 5.46$, $p < .05$; problem-solving: $F[1, 88.2] = 4.52$, $p < .05$). There were no significant group differences for fine motor skills (see Table 4 for means and SDs), and no significant differences in the main effect for environment prior to adoption (i.e., orphanage versus foster care) (see Table 5). Regardless of environment prior to adoption, children's skills improved linearly in all domains except fine motor, as previously described. Finally, a significant linear-by-special needs status interaction was found for communication ($F[1, 165] = 5.25$, $p < .05$), personal-social ($F[1,167] = 4.49$, $p <.05$), and gross motor ($F[1,165] = 3.80$, $p = .05$) with children with special needs showing a significantly more pronounced linear rate of improvement relative to children without medical needs. Thus, the fourth hypothesis was supported with regard to special needs status, but not with regard to preadoptive rearing environment.

Hypothesis # 5: Regional differences in developmental outcomes would emerge, with children adopted from Asian countries having better outcomes than those adopted from Eastern Europe

A number of significant differences emerged according the birth country of the child (see Table 6 for means and SDs). The omnibus test for the ANOVA of between country differences was nonsignificant ($F[4, 98.3) = 2.07$, $p = .09$); however, planned comparisons between specific birth countries revealed several significant group differences. First, children from China and Other Asian countries were rated, on average, significantly higher in communication skills than children from Eastern Europe, (China vs. Eastern Europe $t[97.5] = 2.33$, $p < .05$; Other Asia vs. Eastern Europe: $t[95.7] = 2.65$, $p < .01$). Although omnibus tests for the time-by-birth country interaction were also not significant ($p = .34$), visual inspections of means suggested potential country differences in the linear trend. Specifically, despite starting with significantly lower scores than children from Latin America, Eastern European children scored higher in communication skills at the end of the study period than children from Latin America, $F(1, 194) = 4.29$, $p < .05$, thereby showing marked recovery relative to this group.

Children from all countries were rated, on average, significantly higher in fine-motor skills that children from Eastern Europe, $F(4, 95.9) = 4.06$, $p < .01$ (China vs. Eastern Europe: $t[94.5] = 3.53$, $p < .01$; Korea vs. Eastern Europe: $t[94.8] = 2.79$, $p < .01$; Other Asia vs. Eastern Europe: $t[92.4] = 2.54$, $p = .01$; Latin America vs. Eastern Europe: $t[97.5] = 3.65$, $p < .01$).There was a significant linear time-by-country interaction, $F(4,188) = 2.49$, $p <.05$. Planned comparisons showed that while the fine-motor scores of children from China increased during the study period, they decreased for children from Korea, $F(1, 189) = 6.43$, $p = .01$ (see Table 6 for means). The same difference in trajectory was found in fine-motor skills for children from Other Asian countries (increase) relative to children from Korea (decrease), $F(1, 185) = 5.43$, $p < .05$.

Gross motor skills were also found to be lower in children from Eastern Europe relative to children from China (China vs. Eastern Europe: $t[98.7] = 2.06$, $p < .05$) and Latin America (Latin America vs. Eastern Europe: $t[101] = 1.95$, $p =.05$) (see Table 6).

Consistent with other developmental domains, children from all countries were also rated, on average, significantly higher in problem-solving skills than children from Eastern Europe, $F(4, 98.7) = 4.32$, $p < .01$ (China vs. Eastern Europe: $t[97.3] = 3.40$, $p < .01$; Korea vs. Eastern Europe: $t[97.1] = 2.71$, $p < .01$; Other Asia vs. Eastern Europe: $t[96.8] = 3.81$, $p < .01$; Latin America vs. Eastern Europe: $t[98.4] = 2.81$, $p < .01$). Lastly, children from all countries except Korea were rated, on average, significantly higher in personal-social skills than children from Eastern Europe, $F(4, 98.6) = 4.48$, $p < .01$ (China vs. Eastern Europe: t

[98] = 3.69, $p < .01$; Other Asia vs. Eastern Europe: t [96.3] = 2.65, $p < .01$; Latin America vs. Eastern Europe: t [99.6] = 2.00, $p < .05$).

Discussion

This study followed the development of young IA children for two years post-adoption using a parent-report measure that assessed communication, fine and gross motor skills, problem solving, and personal-social development. Broadly, our findings are consistent with the literature on IA children indicating impressive, although not necessarily complete, developmental recovery following adoption (Albers et al., 1997; Ames, 1997). Several of our hypotheses were confirmed. First, over an 18 month period, the children as a group showed overall improvements in all developmental domains except for fine motor skills, with gross motor skills also improving in a quadratic fashion. By the time children had been in their adoptive homes for 18 months, very few showed delays in any developmental domain measured by the ASQ. However, examining patterns of different subgroups of children helped to explain some of the variability in longitudinal outcomes. Consistent with the findings of previous researchers (Castle et al., 1999; Judge, 2003, Palacios et al., 2010), we found that children who had the lowest developmental scores at Time 1 remained significantly lower by Time 3 in all five domains, despite the fact that almost all of them had climbed into the “normal” range.

We examined a number of other factors that we thought might be relevant to children's developmental outcomes, and the findings were mixed. First, unlike some other researchers, we did not find a relationship between children's age at adoption and developmental progress in any domain. This may have been because the children in our sample were generally quite young at the time of adoptive placement (Mean age = 11 months). Significant age-at-placement effects often involve children adopted as preschoolers or older (Morison & Elwood, 2000; O'Connor & Rutter, 2000), and some studies fail to find effects related to age at placement (Andresen, 1992; Tan & Marfo, 2006). It is possible that other factors, such as the quality of care the child received prior to adoption or biological risks factors such as premature birth or prenatal substance exposure, are more powerful predictors of outcome than age at placement.

Several factors did emerge as relevant to developmental status, both initially and over time. First, significant differences by birth country emerged. Consistent with other research indicating a relatively high level of risk among Eastern European adoptees, our data indicated that across an 18-month period following the adoptive placement, children adopted from Eastern Europe had significantly lower levels of developmental competence in most domains compared with children adopted from other regions.

As anticipated, children with medical problems also demonstrated lower developmental competence in several domains, including language, gross motor, and problem solving skills. Because the range of medical issues was quite diverse, it is unclear why these domains were particularly affected. Our small cell sizes precluded a closer examination of this topic; however, this finding is consistent with previous research indicating that IA children with medical problems are at elevated risk for additional difficulties (Gunnar & van Dulman, 2003; IAP, 2002).

Based upon numerous studies documenting the adverse effects of institutional rearing, we hypothesized that orphanage-reared children would have greater developmental deficits than those adopted from foster care settings; however, in our sample this was not the case. This may have also been due to the fact that, as mentioned earlier, children were quite young at the time of adoption. Additionally, because birth countries vary systematically in terms of

preadoptive rearing conditions, when comparing across preadoptive environments we were unfortunately also comparing across birth countries. Studies that have compared orphanage and foster-care reared children *within* the same birth country do consistently find differences favoring foster-care children (Miller et al., 2005; Smyke et al., 2010), although these differences may be modest (van den Dries, Juffer, van IJzendoorn & Bakermans-Kranenburg, 2010).

This study has several limitations that warrant consideration. First, this study relied on a convenience sample of adoptive families obtained from 6 international adoption placement agencies. Of the adoption agencies approached, only half agreed to participate. Participating agencies may have differed systematically from non-participants in terms of their interest in and commitment to the post-adoption adjustment of children and families. While the centralized record-keeping of some European countries (e.g., Sweden, the Netherlands) allows for large scale, population based studies of IA children and families, IA research in the U.S. continues to rely on convenience sampling. Thus, the extent to which our findings generalize to larger populations of IA families within the U.S. is unknown. A second limitation of our study was its reliance on a parent-report measure rather than direct assessment of children's development. Despite psychometric data indicating that the ASQ discriminates well between delayed and nondelayed groups identified through the use of direct child assessments (Squires & Bricker, 1997), nonetheless, the ASQ measures parent *perceptions* of children's development rather than children's actual performance on standardized measures. Several of the ASQ reliability coefficients were also low. Given that the ASQ has not been used before in an IA population, future studies should include other measures of development (in addition to the ASQ) to examine whether the low internal consistency coefficients we found (for some domains; for others, they were quite consistent with Squires et al., 1997) were an artifact of the measure or, perhaps, due the remarkable differences in development within the IA population. Additionally, cell sizes for certain groups were quite small and the magnitude of the group differences was often modest, indicating that our findings should be interpreted cautiously and subject to independent replication.

Possibly our greatest challenge was the inability to completely isolate the independent effects of birth country, special needs status, and preadoptive rearing conditions, as these variables were confounded. For example, all of the Eastern European children and nearly all of the Chinese adoptees resided in orphanages prior to adoption, whereas all of the Korean and Latin American children were adopted from foster care settings. This made it difficult to determine whether variability in developmental outcomes was related specifically to preadoptive setting or to some other factor associated with a specific birth country. Interestingly, despite the fact that both Eastern European and Chinese children all resided in orphanage settings prior to adoption, developmental scores of Chinese children at Time 1 were significantly better than those of Eastern Europeans, suggesting that some factor other than orphanage care alone was influencing development. While it is possible that Chinese orphanages provide better preadoptive care than those in Eastern Europe, it is also possible that country-specific differences in child relinquishment patterns and birth family risk may, at least partially, account for this effect. As previously mentioned, child relinquishment in China is primarily driven by social attitudes and policies favoring male children; virtually all Chinese adoptees are girls. Relinquishment patterns appear unrelated to biological or psychosocial risk within the birth family (Johnson, 1996; Johnson, Banghan, & Liyao, 1998). By contrast, a study of children placed in orphanages in Russia indicated that these children were significantly smaller and more likely to have experienced perinatal complications and premature birth than Russian norms (St. Petersburg-USA Orphanage Research Team, 2008), suggesting that potential adoptees do have higher rates of biological risk at the time of relinquishment. Additionally, smoking and alcohol consumption during

pregnancy is higher in Eastern Europe than in many other countries (Dymchenko & Callister, 2002). Although our subsample of Eastern European children was small, our findings are consistent with the notion that Eastern European adoptees may have elevated risk for later developmental problems, including relatively high rates of medical problems.

Relatedly, although we found that children with medical problems as a group were less developmentally competent than children without medical conditions, the prevalence of medical problems was not uniform across the different birth countries. The proportion of children with and without medical problems was fairly even for Korea (47.2% SN vs. 52.8% no SN), while only about 20% of the children from China, Latin America and Other Asian countries had special needs. On the other hand, 8 of the 12 Eastern European children in our sample (66.7%) had medical conditions reported by their mothers, raising the possibility that the effects of SN and birth country might be confounded. Because Korea was our largest subgroup ($n = 36$), we were able to compare the developmental scores of children with and without medical conditions. No significant differences were found for any domain, indicating that medical problems alone did not entirely explain differences in developmental outcomes. Further research with larger subgroup samples is clearly needed to clarify these issues.

Despite its limitations, this study has several implications for adoption research and practice. Regarding practice, prospective adoptive parents need to have data available to them on the risks associated with various child and birth country characteristics as they make complex decisions regarding which country to adopt from and what type of child they want to adopt. Although information regarding some preadoptive risk factors may not be available to parents (such as the social history of the child's birth family), the child's birth country and the presence of medical conditions are generally known, and can guide both placement decisions and the provision of post-adoption supports for parents and children. Additionally, longitudinal data on developmental outcomes from this and other studies may help to prepare adoptive parents for specific developmental challenges (such as speech and language delays) that they may experience with their children. Our previous work with IA families revealed that although a substantial proportion of preadoptive parents expected their children to have medical problems, relatively few expected long-term developmental problems (Welsh et al., 2008). When taken together with most other studies on post-adoptive adjustment of IA children published in the past 20 years, this study supports an optimistic view regarding children's outcomes, but also suggests that pre-adoptive parents should receive a more nuanced message regarding developmental recovery than “love conquers all.” Prospective parents should be informed that, at least for some children, medical problems and developmental delays may co-occur; just as important, prospective parents should be informed that developmental catch up may be slow or incomplete, and advised on how to access and navigate appropriate intervention services. This may have particular salience given current trends international adoption, as IA increasingly involves children with special needs (Selman, 2012).

This study contributes to the growing literature on the developmental progress of IA children following adoption. Its main contribution is the examination of birth country effects and the trajectories of different developmental domains. Future research should further delineate the specific trajectories of different developmental domains with both young and school-aged IA children. Additionally, regional differences in children's developmental outcomes utilizing larger, diverse samples of adoptees should receive more research attention. For example, very little is known about the outcomes of children adopted from Latin America, Africa or Asian countries other than China and Korea. While there is much speculation regarding the reasons for regional differences, definitive data are lacking. Better understanding of the domain-specific impact of preadoptive environmental and child

characteristics may help adoptive parents to better prepare for developmental challenges and facilitate the development of more specific, effective, evidence-based interventions for IA children and their families. Finally, this is the first study to explore the utility of the ASQ with IA children. Although the ASQ has been translated into several languages and found to have good psychometric properties with diverse populations (e.g., Heo, Squires, & Yovanoff, 2008), the extent to which parental ratings of children's development on this measure may be influenced by cultural differences between rater and child (often the case in IA) remains unknown. However, given the young age of our participants at the time of adoption, it is unlikely that IA children's cultural background may have influenced their parents' ratings on the ASQ. Future studies should examine whether similarities/differences between the culture of the adoptive parent and the culture of the IA child correlate in any way with parental ratings on measures like the ASQ.

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Table 1

Developmental means and standard deviations across time

	Time 1		Time 2		Time 3	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	37.28	15.57	46.68	12.70	52.23	9.31
Fine-motor	46.25	12.36	45.71	11.67	47.79	11.95
Gross-motor	48.60	15.01	53.16	10.19	53.73	9.48
Personal-social	42.82	12.70	46.62	10.00	52.28	9.07
Problem-solving	43.59	14.98	46.99	11.55	50.84	11.58

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption; *M* = mean; *SD* = standard deviation.

Table 2

Number and percentage of children in the clinical range by developmental domain and time point.

	Time 1		Time 2		Time 3	
	n	%	*n*	%	*n*	%
Communication	36	34.0	14	13.2	4	3.8
Fine-motor	15	14.2	12	11.3	3	2.8
Gross-motor	13	12.3	5	4.7	2	1.9
Personal-social	16	15.1	11	10.4	2	1.9
Problem-solving	20	18.9	9	8.5	6	5.7

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption.

Table 3

Developmental means and standard deviations across clinical status and time

	Time 1				Time 2				Time 3			
	Clinical		Nonclinical		Clinical		Nonclinical		Clinical		Nonclinical	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Communication	21.11	8.95	46.23	10.31	41.86	13.29	49.37	11.62	50.00	9.61	53.33	9.02
Fine-motor	29.00	12.13	49.29	9.64	40.33	13.95	46.69	11.02	47.86	14.10	47.78	11.67
Gross-motor	21.54	16.51	52.64	9.70	41.67	15.72	54.77	8.08	46.92	18.09	54.72	7.13
Personal-social	24.06	12.81	46.35	9.11	38.75	10.41	48.13	9.23	47.67	12.23	53.07	8.25
Problem-solving	20.53	12.01	49.06	9.35	40.00	13.23	48.67	10.52	46.75	15.67	51.85	10.20

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption.

Clinical = child fell in the clinical range at Time 1, Nonclinical = child fell in the nonclinical range at Time 1.

Table 4

Developmental means and standard deviations across special needs status and time

	Time 1				Time 2				Time 3			
	SN		NS		SN		NS		SN		NS	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Communication	32.58	16.45	39.73	14.32	42.83	14.00	49.46	10.60	51.77	10.29	52.67	8.61
Fine-motor	44.22	13.86	48.04	11.15	44.68	11.83	46.55	11.98	46.94	12.89	47.97	11.60
Gross-motor	42.66	18.49	50.98	12.88	50.65	14.07	54.00	7.96	51.77	12.08	54.49	8.49
Personal-social	38.94	13.57	45.27	11.54	42.74	11.82	48.93	8.51	51.77	9.45	52.58	9.14
Problem-solving	39.55	17.16	45.56	13.66	42.83	13.44	48.93	9.66	49.84	12.28	50.69	11.86

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption; SN = special needs NS = no special needs; *M* = mean; *SD* = standard deviation.

Table 5

Developmental means and standard deviations across environment (orphanage vs. foster care)

	Time 1				Time 2				Time 3			
	O		FC		O		FC		O		FC	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Communication	36.09	15.81	38.88	14.94	46.56	11.72	46.70	13.61	51.96	7.42	52.79	10.36
Fine-motor	43.80	13.09	48.44	11.68	43.44	12.70	47.34	10.57	48.78	12.26	47.12	11.69
Gross-motor	46.85	15.89	49.48	14.60	52.67	11.31	53.94	9.09	53.00	10.57	54.42	8.89
Personal-social	42.93	12.32	42.96	12.83	47.00	9.79	46.25	10.18	53.59	8.48	51.25	9.64
Problem-solving	42.22	15.76	44.69	14.75	46.67	11.63	47.23	11.22	49.55	13.72	52.12	9.36

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption; O = orphanage; FC = foster care; *M* = mean; *SD* = standard deviation.

Table 6

Developmental means and standard deviations across countries and time

Domain	Time 1		Time 2		Time 3	
	China		China		China	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	38.94	13.96	48.79	12.12	52.79	6.54
Fine-motor	46.52	10.79	46.52	11.42	51.67	10.28
Gross-motor	50.30	12.50	54.39	7.68	55.45	5.78
Personal-social	46.36	10.33	50.76	7.91	55.29	7.17
Problem-solving	45.48	10.98	50.15	8.05	51.21	12.25
	Korea		**Korea**		**Korea**	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	37.73	16.01	44.33	14.61	53.29	9.85
Fine-motor	48.28	12.35	46.13	11.45	44.71	11.69
Gross-motor	48.44	16.53	52.42	9.48	52.86	9.49
Personal-social	42.27	14.26	44.03	10.52	49.43	10.83
Problem-solving	43.94	16.14	45.33	12.38	50.43	9.73
	Eastern Europe		**Eastern Europe**		**Eastern Europe**	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	27.50	16.99	42.50	10.55	49.55	9.86
Fine-motor	37.92	17.12	37.08	14.84	40.91	15.30
Gross-motor	42.08	18.52	50.42	14.99	46.82	17.50
Personal-social	35.83	13.79	40.00	7.69	48.18	10.55
Problem-solving	32.08	17.77	36.67	14.20	46.36	17.76
	Latin America		**Latin America**		**Latin America**	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	39.17	15.93	45.83	12.76	48.33	12.49

	Latin America		Latin America		Latin America	
	M	***SD***	***M***	***SD***	***M***	***SD***
Fine-motor	51.67	10.30	50.91	8.89	49.58	12.15
Gross-motor	49.58	18.52	54.55	13.50	58.33	4.44
Personal-social	40.42	11.96	46.67	11.74	54.58	4.50
Problem-solving	45.83	18.69	47.50	8.39	51.67	10.30

	Other Asia		Other Asia		Other Asia	
	M	***SD***	***M***	***SD***	***M***	***SD***
Communication	40.56	12.11	53.89	6.01	56.67	4.33
Fine-motor	43.33	8.66	47.78	6.67	52.22	7.12
Gross-motor	50.56	6.35	54.44	10.14	52.78	9.72
Personal-social	45.56	6.35	50.00	8.29	55.00	6.12
Problem-solving	48.33	7.50	55.56	4.64	56.88	5.30

Note. Time 1 = 6 months post-adoption; Time 2 = 12 months post-adoption; Time 3 = 24 months post-adoption; *M* = mean; *SD* = standard deviation