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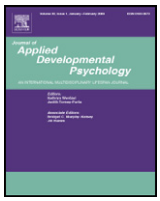

Early developmental and psychosocial risks and longitudinal behavioral adjustment outcomes for preschool-age girls adopted from China

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ABSTRACT

The central goal of this longitudinal study was to examine behavioral adjustment outcomes in a sample of preschool-age adopted Chinese girls. Research examining the effects of institutional deprivation on post-adoption behavioral outcomes for internationally adopted children has been constrained by the frequent unavailability of data on the institutional experiences of adopted children. Using child-level measures of the residual effects of pre-adoption deprivation or adversity, the present study of 452 preschool-age girls adopted from China tested the hypothesis that these measures will better predict behavioral adjustment (as measured on the CBCL/1½–5) than age at adoption (AAA), used conventionally as a proxy measure of the magnitude of deprivation effects. Along with AAA ($M = 13.1$ months, $SD = 5.1$), our measures were used to predict behavioral adjustment at two time points ($M_{age} = 2.7$ years at Time 1 and 4.8 years at Time 2). There was strong stability in behavioral adjustment across time, and the regression results showed that delays in social skills, refusal/avoidance behaviors, and crying/clinging behaviors at the time of adoption, rather than AAA, predicted behavioral adjustment outcomes.

The past two decades have seen renewed interest in research on the impact of institutional deprivation. Following the collapse of Romania's communist government in 1989, the disturbing levels of deprivation among children raised in state-run institutions in Romania evoked unparalleled humanitarian responses and led to the adoption of many of these children by families in North America and other industrialized countries (Gunnar, Morison, Chisholm, & Schuder, 2001). Taking advantage of this "natural experiment", developmental scientists have revisited a variety of issues within the larger "early experience" question. To what extent are these consequences alterable as a function of positive post-adoption caretaking environments? What child- and context-level factors are associated with stability or change in developmental trajectories?

Research on adopted Romanian children in Canada and the United Kingdom (Beckett et al., 2006; Benoit, Jocelyn, Moddemann, & Embree, 1996; Fisher, Ames, Chisholm, & Savoie, 1997; Kreppner et al., 2007; Marcovitch et al., 1997; Morison, Ames, & Chisholm, 1995; Rutter, O'Connor, & ERA, 2004; Rutter & the English and Romanian Adoptees, ERA Study Team, 1998) shows remarkable convergence of findings on some of these fundamental questions. For example, studies have consistently found marked heterogeneity in long-term outcomes. Even in the face of significant catch-up for the majority of children, the effects of early deprivation persist for some children.

With the cessation of adoptions from Romania, adoptions from China (as well as Russia) offer remarkable opportunities not only to explore questions emerging from the Romanian adoption research, but to expand the broader research agenda on early deprivation and later development. While the Child Welfare Institutes (CWIs) from which most Chinese children are adopted may be superior to communist-era Romanian institutional environments, they have been similarly characterized by large child-caregiver ratios and overcrowded living conditions.

As of 2009, nearly 75,000 Chinese children had been adopted by American parents (United States Department of State, 2010). The size of this population alone makes it an important target group for developmental inquiry. Equally important, by virtue of the continuous and sizeable adoption of thousands of Chinese children each year, China adoptions make it possible for researchers to design and fine-tune studies over time to address emerging and recurring questions on the broader subject of adoption as a form of intervention for institutional deprivation.

The study reported in this paper is part of a program of inquiry employing large-scale longitudinal survey methodology to explore child- and family-level correlates and predictors of behavioral outcomes for children adopted from China. Central to this research is the search, beyond the conventional use of age at adoption as a predictor, for measures of adoption-point child behavioral and developmental attributes indicative of possible residual effects of

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pre-adoption adversity. Pre-adoption adversity is conceptualized to include vulnerabilities associated not only with the deleterious psychosocial effects of institutional care but also child-level constitutional factors that may have been present at the time of institutionalization. Regardless of specific etiology, pre-adoption adversity can manifest itself in observable behavioral and developmental attributes that may, in turn, influence short-term and long-term post-adoption outcomes.

In much of the extant research on international adoptions, age at adoption has been used as a proxy for the length of time spent in institutions and to a lesser degree, a proxy measure for pre-adoption adversity (see Beckett et al., 2007; Marcovitch et al., 1997; Weitzman & Avni-Singer, 2005). Implicit in this use of age at adoption is the assumption of a linear relationship between duration of institutionalization and magnitude of deprivation such that the longer children have been institutionalized, the greater their presumed risk of developmental damage and, hence, the more limited their prospects for favorable later outcomes. Notwithstanding its intuitive appeal and dominance in empirical research, there are some fundamental problems with the use of this variable, especially when employed as the sole or primary predictor of outcomes. First, children who enter institutional care with pre-existing constitutional problems are more likely to present poorer outcomes regardless of duration of exposure to institutional care. Second, it is possible for children adopted at the same age to have been exposed to different degrees of deprivation, even within the same care environment. Third, even assuming comparable developmental status at the time of institutionalization, it is possible for children adopted at an older age (e.g., 18 months) from relatively better care settings to present a lesser degree of deprivation than children adopted at a younger age (e.g., 12 months) from conditions of severe neglect. Thus, the magnitude of deprivation effects cannot be reliably inferred from age at adoption.

Reviewing studies of Romanian children adopted into Canada, Pomerleau and associates (2005) underscored findings by Castle et al. (1999) that while children adopted at younger ages generally arrive in better conditions and make better progress in the first months following adoption, the relationship between age at adoption and later development appears to hold mostly for children from poor-quality pre-adoption contexts. Pomerleau et al. (2005) cautioned, therefore, that "when considering age at time of adoption as a predictive variable of development, it appears essential to take the pre-adoption living conditions into account" (p. 446). The fact that it is impossible in most studies to collect evidence on pre-adoption conditions does not diminish the admonition for caution in the use of age at adoption as an independent variable. To the contrary, it underscores the imperative to explore more proximal variables that are likely to better index the residual effects of institutionalization and other forms of pre-adoption adversity.

Three classes of such variables include anthropometric measures, normative developmental measures, and parental reports of physical, behavioral and psychosocial conditions noticeable at the time of the adoption. The first two (anthropometric and normative developmental measures) have an established tradition in research on post-institutional internationally adopted children and are being used increasingly in China adoption research to gauge the degree of developmental delay at the time of adoption. For example, two recent Canadian studies (Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008; Pomerleau et al., 2005) have used height-to-age ratio, weight-to-height ratio, and head circumference to predict changes in mental and motor development, as measured on the Bayley Scales of Infant Development (Bayley, 1993). Two recent U.S. studies (Wilson & Weaver, 2009; Wilson, Weaver, Cradock, & Kuebli, 2008), both conducted on a much smaller sample of 23 children (54% adopted from China), have employed not only the Bayley Scales but also parental ratings on the Ages and Stages Questionnaire (Bricker, Squires, & Mounts, 1995) to measure and monitor the extent of developmental delays from the time of adoption to 6 and 19 months post-adoption.

The data from all of these studies, and from studies examining the general health and developmental status of children adopted from China (e.g., Miller & Hendrie, 2000), suggest consistently that mild to severe developmental delays are quite common at the time of adoption. For example, in their sample of 192 clinic-referred children adopted from China, Miller and Hendrie reported that 55% were delayed in gross motor skills and 49% were delayed in fine motor skills on the Peabody Developmental Motor Scales. They also reported that 43% were delayed in language, 32% in cognitive and 28% in social–emotional development, as measured on the University of Michigan Early Intervention Developmental Profile (Schafer & Moersch, 1981). Wilson et al. (2008) reported that 60–70% of their sample had mild to significant delays in cognitive and motor development as measured on the Bayley Scales, while Nelson (2001), also using the Bayley Scales, found mild to severe delay rates of 59% and 89% in cognitive and motor development, respectively. These studies share the common attribute of employing relatively small samples of adopted children, ranging from 23 (Wilson & Weaver, 2009; Wilson et al., 2008) through 70 (Cohen et al., 2008) to 123 (Pomerleau et al., 2005). Miller and Hendrie (2000) studied 192 clinic-referred children but their analyses did not include predictions of developmental outcomes from measures of delays around the point of adoption.

Clearly developmental status at the time of adoption is an important measure of the potential residual effects of pre-adoption adversity. However, documenting them in large-scale survey research programs poses a major challenge. Unless heavily funded, researcher-administered measures of delay are unrealistic and because there are no standard instruments that are employed commonly in the assessment of delay in newly adopted children, even in international adoption clinics set up expressly and specifically to provide services to adoptive families (Weitzman, 2003), obtaining comparable standardized scores from evaluation records is not a viable option either. The solution we have adopted in our line of inquiry is to derive measures of developmental delay from parents' reporting of results from post-adoption medical evaluations, typically conducted within one week of arrival in the adoptive country. Further discussion of this approach is presented in the Methods section.

Of the three types of measures under discussion, the one receiving the least amount of attention in existing research pertains to adoption-point parent-identified signs and symptoms of physical, behavioral, and psychosocial problems. There is a clear need for more focused empirical work in this area, and a trend in that direction is discernible in the literature. In several studies, single-item measures of initial rejecting behaviors as well as pre-adoption abuse and/or neglect have been used to augment age at adoption as an independent variable and have been found to be predictive of behavioral outcomes (Groza & Ryan, 2002; Tan & Marfo, 2006; Verhulst, Althaus, & Versluis-den Bieman, 1992). More recently, the ERA Study Team has reported two studies on Romanian children adopted into the United Kingdom in which the presence or absence of meaningful vocalization at the time of adoption predicted outcomes in cognition, language, and specific indicators of impairment or psychopathology once children adopted before age 6 months were excluded from the analyses (Croft et al., 2007; Kreppner et al., 2007). Age at adoption was not associated with these different outcomes. Croft et al. (2007) characterized the presence of minimal language, even in the form of basic imitation of sounds, as "a rough index of the degree of institutional deprivation" that likely reflects the level of language and cognitive reserve that had "survived the effects of institutional deprivation" (p. 41).

In the present study, we utilized two parent-report measures to capture multiple dimensions of the potential residual effects of pre-adoption adversity on physical and psychosocial characteristics. The first, labeled Signs and Symptoms, consists of readily observable

physical indicators (e.g., skin rashes) that might be suggestive of the quality of the pre-adoption caretaking environment. The second, labeled Initial Adaptation to Adoption, consists of child behaviors indicative of adaptation challenges during the earliest post-adoption period (i.e., Avoidance/Refusal behaviors and Crying/Clinging behaviors). Described in greater detail in the methods section, these two sets of measures and the validation work done on them represent original contributions from our research program.

Theoretically framed, pre-adoption adversity–whether it is associated with (a) child-level constitutional problems predating institutionalization, (b) the well documented deleterious socio-emotional institutional environment (see The St. Petersburg-USA Orphanage Research Team, 2008), or (c) the combined influence of these two forces–can manifest itself in observable physical and socio-emotional problems and in normatively measurable delays in development at the time of adoption. Measures relating to these risk factors are likely to have a more meaningful predictive relationship with short- and long-term behavioral adjustment outcomes than the conventionally used proxy measure of age at adoption.

In this paper, we explore these hypothesized relationships using retrospective data on developmental and psychosocial indicators of pre-adoption adversity and prospective longitudinal data on behavioral adjustment at two time points (with a 2-year interval) on a large sample of preschool-age girls adopted from China. In view of the limited research on parent-report measures that capture the potential residual effects of pre-adoption adversity on adopted children's physical and psychosocial characteristics, our main purposes were to: (1) describe the extent of early developmental and psychosocial risk, as measured by parental reports of Signs and Symptoms, Delays in Gross Motor, Fine Motor, Social, and Cognitive Skills, and Avoidance/Refusal and Crying/Clinging; (2) examine the relationships among these indicators of adversity, as well as their relationship with later behavioral adjustment; and (3) test the hypothesis that these indicators have stronger predictive relationships with short- and long-term behavioral adjustment than age at adoption.

Methods

Participants

Participants for the first phase (baseline) of the study were recruited through internet discussion groups and adoption agencies in early 2005. A recruitment letter was posted on the message board of the internet moderator's group with an introduction of the research project by one of the moderators. The other moderators were asked to disseminate the letter to members of their respective groups. At the same time, the letter, together with the same introduction, was mailed to the directors of 10 adoption agencies in the U.S. (e.g., Chinese Children Adoption International, China Adoption With Love, Inc., Alliance for Children, Children's Hope International, and the Great Wall China Adoption). Overall, the study was endorsed by at least 120 internet groups and six adoption agencies. The groups included organizations that are for adoptive families in general (e.g., Families with Children From China, Raising China Children), groups that were specifically for children adopted from certain regions of China, and groups that were for specific areas of development (e.g., attachment) or general adjustment. Families who belonged to more than one organization received the information about the study simultaneously from multiple sources. Parents interested in participating were instructed to contact the research program directly with information about the number of children they had adopted from China, age of each child, and their regular mailing address. Surveys were mailed to 1092 families to collect retrospective data on the children's initial adaptation to adoption and current behavioral adjustment (measured with the Child Behavior Checklist). A total of 853 (78.1%) families with 1121 Chinese children returned the surveys.

In 2007 the 853 families were contacted for the follow-up study, using contact information they provided in 2005. For 72 families the contact information was no longer valid and one family declined to participate. From the remaining 780 families, Child Behavior Checklist (CBCL) data were obtained from 675 families (86.5%) with 882 children, using the same data collection method as in 2005. There was no difference in child and family characteristics between the 882 children who participated and the 239 who did not participate in the follow up. From the 882 children, the following criteria were used to identify a sample of preschool-age girls for the current analysis. First, the 36 boys in the sample were excluded, since the overwhelming majority of children adopted from China are girls. Second, only children with complete data for both Time 1 and Time 2 were included; this resulted in the exclusion of 11 children. Finally, to keep the focus on the preschool-age group (age < 6 years), 383 children were excluded because they were already in grade school and beyond at Time 1 or had transitioned into grade school since Time 1.

As a result of applying these criteria, 452 girls were retained for the current analysis, all of whom had behavioral adjustment data collected with the CBCL/1½–5 version at both time points. The girls were from 411 families (96% white and 83% two-parent households). The adoptive mothers' average age was 41.9 years (SD = 5.3) at Time 1. As a group, the adoptive families had high socioeconomic status (SES): 53% of the mothers had a Master's level education or higher and 55% reported an annual income of US$90,000 or higher. Forty-six percent of the mothers worked full-time and 30% of the mothers stayed at home. Data analysis with one child randomly selected from families with multiple children yielded similar results; consequently, all 452 children were included in the analyses reported in this paper. Their average age was 2.7 years (SD = 0.9) at Time 1 and 4.8 years (SD = 0.9) at Time 2.

Instruments and procedures

Family and child demographics

Family demographic data included the adoptive mothers' age, weekly hours of employment, education level (1 = high school to 6 = post-doctorate), and household income (1 = under $19,999 to 15 = over $150,000). Child demographic data included current age and age at adoption which were computed using their date of birth, date of adoption, and the survey completion date.

Signs and symptoms

The first dimension of indicators of pre-adoption adversity was measured using a list of 11 easily observable *signs and symptoms* generated from in-depth preliminary interviews with adoptive families and from an earlier study of post-adoption behavioral adjustment in 750 children adopted from China (Tan & Marfo, 2006). To avoid the appearance of asking parents to "diagnose" the children's conditions at adoption, all 11 signs/symptoms were easily observable to untrained eyes (e.g., scars). Parents were asked on the questionnaire to check all signs/symptoms that they observed in their child when the child was first adopted. If a sign/symptom was not checked it was coded 0 and if checked it was coded 1. The total number of signs/symptoms was computed and then recoded, with codes ranging from 0 (no signs/symptoms observed) to 5 (five or more observed signs/symptoms).

Developmental delays at adoption

The second dimension of pre-adoption adversity focused on *developmental delays* at the time of adoption. It is a standard practice for internationally adopted children to receive comprehensive medical examinations within one week of arrival in the adoptive country. In this study, parents reported whether their child was assessed to have no/minor delay (coded as 0), moderate delay (coded as 1), or severe delay (coded as 2) in four developmental domains: Gross Motor, Fine Motor, Social, and Cognitive Skills. In the data analysis, separate scores for reported delay in each domain were used.

Initial adaptation to adoption

The third dimension of the potential residual effects of pre-adoption adversity on the psychosocial characteristics of the child was labeled Initial Adaptation to Adoption, and consisted of child behaviors indicative of adaptation challenges during the earliest post-adoption period. The initial period of adaptation was defined as the first 3 weeks following the adoption. This period includes the two weeks it typically takes adoptive parents to obtain the required paperwork for their children to enter their adoptive country and the week following the arrival. Parents typically refer to this time frame when talking about their child's initial adjustment.

Ten items were used to measure parents' perceptions of their children's initial adaptation to adoption. These items were generated from the same earlier study that helped develop the above-mentioned measure of signs and symptoms. Items focused on early behavioral patterns in interactions with parents (e.g., avoiding affection). Parents were first asked to check if a given behavior was observed. For any applicable behavior, the parent then reported approximately how long it lasted (<1 week, 1–2 weeks, and >2 weeks). Responses were re-scored as 0 (behavior not observed), 1 (observed for 2 weeks or less) and 2 (observed for more than 2 weeks). Exploratory factor analysis using principal axis factoring and promax rotation extracted two factors that were conceptually and statistically meaningful: Avoidance/Refusal ($\alpha = .73$), which contained seven items (e.g., avoid parent's affection) and Crying/Clinging ($\alpha = .65$) (e.g., crying when parents were off sight), which contained three items. Summary scores were computed for each factor by averaging the item scores so that Avoidance/Refusal and Crying/Clinging were scaled from 0 (behavior not observed) to 2 (observed for more than 2 weeks).

Child Behavior Checklist (CBCL)

As mentioned earlier, the preschool version of the Child Behavior Checklist (CBCL/1½-5; Achenbach & Rescorla, 2000) was used to assess the girls' behavioral adjustment at baseline and approximately two years later. The CBCL/1½-5 asks parents to rate 99 behaviors (e.g., Defiant) as 0 (*Not True of the child*), 1 (*Somewhat/Sometimes True*), or 2 (*Very True/Often True*). Sixty-seven of the 99 items are used to form seven syndromes. Six of these syndromes are used to construct two broadband summary scales: *Internalizing* Problems and *Externalizing* Problems. The Internalizing Problems include four syndromes (Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn). The Externalizing Problems include two syndromes (Attention Problems and Aggressive behaviors). The sum of all 99 items, plus one that was listed by the parent forms the CBCL Total Problems (note that Total Problems is *not* simply the sum of Externalizing and Internalizing Problems). The internal consistency reliabilities estimated using Cronbach's alpha for the CBCL scales were .82 (Internalizing), .90 (Externalizing), and .93 (Total Problems). Achenbach and Rescorla (2000) recommend the use of raw scores for statistical analysis and provide cutoff points for normal, borderline, and clinical adjustment. In our report, we combined the categories for borderline and clinical adjustment.

Results

Descriptive statistics for indicators of pre-adoption adversity

Age at adoption (AAA)

As a group these girls were adopted at a fairly young age, with about 90% of them adopted at 18 months or younger and half adopted at 12 months or younger. Their average age at the time of adoption was just over one year ($M = 13.1$ months, $SD = 5.1$), ranging from 3 to 49.8 months. The distribution of AAA was positively skewed (skewness = 3.6). For all subsequent analyses involving the variable, skewness was corrected with a natural log transformation.

Signs and symptoms

Fifty-two percent of the girls showed at least one of the 11 signs/symptoms. Specifically, 28.1% of the girls had one sign/symptom, 13.7% had two, 6.4% had three, 2.2% had four, and 2% had five or more. The two most common signs/symptoms were rashes (19% of the sample) and scars (17%).

Developmental delays at adoption

The reported rates of moderate and severe delays were: 34.7% and 7.5% for Gross Motor Skills, 23.2% and 4.7% for Fine Motor Skills, 14.4% and 2.2% for Social Skills, and 9.7% and 0.7% for Cognitive Skills. Overall, half of the children were delayed in one or more of the four developmental domains. The domain with the greatest delay was Gross Motor Skills, with 42% of the children reported to have been classified as moderately or severely delayed.

Initial adaptation to adoption

Fifty-four percent of the children exhibited Avoidance/Refusal behaviors and 65% exhibited Crying/Clinging behaviors. Although the two areas were correlated ($r = .13, p < .01$), Crying/Clinging behaviors were exhibited significantly more often ($M = 0.7$, $SD = 0.7$) than Avoidance/Refusal behaviors ($M = 0.2$, $SD = 0.3$), $t\ (451) = 14.7$, $p < .01$.

Bivariate correlations

Table 1 presents the means, standard deviations, and Pearson product moment correlations among the risk/adversity indicators. Also included in the table are the correlations of these variables with the CBCL Internalizing, Externalizing, and Total Problems at Time 1 and Time 2. Children adopted at an older age were reported to be less severely delayed in Gross Motor Skills but more severely delayed in Cognitive Skills. Children adopted at an older age also showed more Signs and Symptoms, more Refusal/Avoidance behaviors, and more Crying/Clinging behaviors. The seven indicators of pre-adoption adversity in this study were mostly correlated significantly with each other. They also correlated significantly with both Time 1 and Time 2 CBCL scores while Age at Adoption was only correlated with Time 2 CBCL scores. Delays in Social Skills, Avoidance/Refusal, and Crying/Clinging had low to moderate correlations with the CBCL scores at both time points. All but one of the 18 correlations were significant (*r*s ranging from .07, $p > .05$, to .40, $p < .001$).

It should be noted that the sample's overall adjustment was well within the normal range and as a matter of fact quite favorable. In spite of a significant increase in the average scores and in the percentage of children with borderline/clinical adjustment in Internalizing and Total CBCL Problems from Time 1 to Time 2, the adopted Chinese girls had significantly lower average CBCL scores (i.e., better behavioral adjustment) at both times than the preschool-age girls from the U.S. normative sample ($N = 700$; Internalizing: $M = 8.7$, $SD = 6.3$; Externalizing: $M = 13.1$, $SD = 7.8$, and Total Problems: $M = 33.4$, $SD = 18.8$) (Achenbach & Rescorla, 2000).

From Time 1 to Time 2, there was strong stability in the CBCL scores (*r*s = .61, .69, and .71 for Internalizing, Externalizing, and Total, respectively). Similarly strong stability was also observed in the proportion of children scoring in the borderline/clinical adjustment range. Although the percentage of borderline/clinical cases in the current sample was lower (Internalizing Problems: 8% at Time 1, 13.9% at Time 2; Externalizing Problems: 6.6% at both times; Total Problems: 5.8% at Time 1, 8.6% at Time 2) than the U.S. normative sample (i.e., 21% for Internalizing Problems, 18% for Externalizing and Total Problems), the percentage of children who remained in the borderline/clinical range from Time 1 to Time 2 was quite high, ranging from 58.3% for Internalizing Problems, 56.7% for Externalizing Problems, to 61.5% for Total CBCL Problems.

Table 1
Summary of means (*SD*s) and bivariate correlation coefficients among indicators of pre-adoption adversity and CBCL scores ($N = 452$).

	M (*SD*)	2	3	4	5	6	7	8	9	10	11	12	13	14
Indicators of pre-adoption adversity														
1. Age at adoption (natural log)	2.5 (0.3)	−.01	−.12	−.02	.09	.08	.10	.12	.08	.06	.09	.10	.10	.11
2. Signs and symptoms	0.9 (1.2)	–	.20	.12	.14	.12	.17	.20	.19	.10	.16	.14	.10	.11
3. Delays in gross motor skills	0.5 (0.6)		–	.59	.30	.34	.02	0	.11	.10	.12	.12	.09	.12
4. Delays in fine motor skills	0.3 (0.5)			–	.31	.41	.09	−.01	.13	.14	.15	.15	.14	.17
5. Delays in cognitive skills	0.1 (0.3)				–	.50	.08	.05	.09	.06	.09	.11	.03	.08
6. Delays in social skills	0.2 (0.4)					–	.26	.10	.30	.17	.26	.26	.12	.21
7. Initial avoidance/refusal	0.2 (0.3)						–	.12	.40	.22	.34	.33	.19	.26
8. Initial crying/clinging	0.7 (0.7)							–	.28	.12	.25	.18	.07	.15
Behavioral adjustment														
9. Internalizing—Time 1	5.8 (5.4)								–	.54	.82	.61	.42	.57
10. Externalizing—Time 1	8.7 (6.9)									–	.87	.49	.69	.64
11. Total CBCL—Time 1	23.9 (16.7)										–	.62	.64	.71
12. Internalizing—Time 2	7.7 (6.4)											–	.68	.88
13. Externalizing—Time 2	8.4 (7.6)												–	.90
14. Total CBCL-Time 2	25.2 (18.8)													–

Note. Coefficients ≥ .09 are significant at .05 level, coefficients ≥ .12 are significant at .01 level, and coefficients ≥ .16 are significant at .001 level.

Regression analyses

Multiple regression analyses were used to examine the predictive relationship between the adopted Chinese girls' Age at Adoption as well as the seven indicators of pre-adoption adversity and Time 1 and Time 2 CBCL scores. Five demographic variables were treated as control variables (i.e., child's Age at Time 1, Family Income, and Mother's Age, Educational Level, and Employment). Multicollinearity involving the predictors and control variables was not an issue as the correlations were generally weak (median $r = .04$, mean $r = .10$) and ranged from −.12 (Age at Adoption and Delays in Gross Motor Skills) to .59 (Delays in Gross Motor Skills and Delays in Fine Motor Skills).

As a first step, we examined how much additional variance in the Internalizing, Externalizing, and Total Problem scores at Time 1 and Time 2 could be explained by Age at Adoption (AAA), as well as each of the other seven indicators of pre-adoption adversity, over and above the variance that was accounted for by the control variables. The control variables were first entered as one set into a regression model to obtain the percentage of variance explained (R^2). Next, a single predictor variable (e.g., Age at Adoption) was added to the regression model to determine the change in R^2 (ΔR^2) due to that variable along with the level of significance for the incremental variance explained (see Table 2). The predictor variable was then removed from the regression equation before the next indicator of pre-adoption adversity (e.g., Signs and Symptoms) was added to the regression equation. This process was repeated until the incremental variance explained for each of the risk factors was obtained.

For Internalizing Problem scores, the change in R^2 resulting from the addition of each variable ranged from 0.3% for Age at Adoption (AAA) to 14.4% for Avoidance/Refusal at Time 1. At Time 2, a similar pattern was observed, with the ΔR^2 values ranging from 0.8% for AAA to 10.5% for Avoidance/Refusal. For Externalizing Problem scores, the ΔR^2 values were smaller than the values for Internalizing Problems. At Time 1, the ΔR^2 values ranged from 0.3% for AAA and Delays in Cognitive Skills to 4.8% for Avoidance/Refusal. At Time 2, the ΔR^2 values ranged from 0.1% for Delays in Cognitive Skills to 3.9% for Avoidance/Refusal. For Total Problems, the ΔR^2 values ranged from 0.5% for AAA to 10.6% for Avoidance/Refusal at Time 1. At Time 2, the ΔR^2 values ranged from 0.6% for Delays in Cognitive Skills to 7.2% for Avoidance/Refusal. Overall, Age at Adoption added a very small amount of variance in the CBCL scores as compared to the individual indicators of pre-adoption adversity.

To further examine the relationship between each of the eight predictors and the children's CBCL scores at Time 1 and Time 2, multiple regressions were conducted that simultaneously included all 13 variables into the model (i.e., the five control variables and the eight predictors). As shown in the first six columns in Table 3, the conventional proxy measure of pre-adoption adversity, Age at Adoption, was not a significant predictor, while Delays in Social Skills, Avoidance/Refusal behaviors, and Crying/Clinging behaviors emerged as the most

Table 2
Summary of change in R^2 that individual indicators of pre-adoption adversity added to control variables ($N = 452$).

	Time 1			Time 2		
	Internalizing	Externalizing	Total	Internalizing	Externalizing	Total
R^2 for control variables	.044	.023	.036	.022	.025	.025
Additional R^2						
Age at adoption (natural log)	.003	.003	.005	.008	.009*	.011*
Signs and symptoms	.039***	.009*	.028***	.023***	.011*	.015**
Delays in gross motor skills	.013*	.015**	.018**	.018**	.012*	.018**
Delays in fine motor skills	.014**	.022***	.023***	.024***	.024***	.031***
Delays in cognitive skills	.004	.003	.006	.010*	.001	.006
Delays in social skills	.076***	.032***	.061***	.068***	.018**	.047***
Initial avoidance/refusal	.144***	.048***	.106***	.105***	.039***	.072***
Initial crying/clinging	.078***	.018**	.067***	.035***	.007	.027***

Note. Control variables consisted of child age at Time 1, family income, and mother's age, education, and employment status. Numbers for each variable represent the change in R^2 resulting from adding the predictor variable to the multiple regression model containing the control variables. After determining the change in R^2 for the predictor variable, it was removed from the regression model before examining the next predictor variable.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3
Summary of beta coefficients of multiple regression analyses on the adopted Chinese girls' adjustment ($N = 452$).

	CBCL—Time 1			CBCL—Time 2					
				Model 1			Model 2		
	Internal	External	Total	Internal	External	Total	Internal	External	Total
Demographics-control variables									
Child age at Time 1	.05	−.11*	−.04	−.07	−.17***	−.14**	−.10**	−.10**	−.11**
Family income	−.04	−.09	−.08	−.08	−.04	−.06	−.06	.02	0
Mother's age	.10*	.10*	.14**	.12**	.14**	.16***	.07	.07	.07
Mother's education	−.11*	−.09	−.11*	−.06	−.02	−.04	0	.04	.04
Mother's employment	−.04	.02	−.02	.01	.02	.02	.04	.01	.04
Indicators of pre-adopt. adversity									
Age at adoption (natural log)	−.01	.03	.02	.05	−.08	−.08	.05	.07	.06
Signs and symptoms	.06	.03	.05	.04	.05	.03	0	.03	−.01
Delays in gross motor skills	.01	.05	.06	.06	.04	.05	.03	.01	.01
Delays in fine motor skills	.01	.11	.09	.08	.13*	.12*	.05	.06	.06
Delays in cognitive skills	−.11*	−.09	−.10	−.07	−.10	−.09	0	−.04	−.02
Delays in social skills	.21***	.12*	.17**	.17**	.08	.14*	.06	−.01	.02
Initial avoidance/refusal	.30***	.17***	.25***	.25***	.15**	.21***	.09*	.04	.03
Initial crying/clinging	.22***	.10*	.21***	.13**	.05	.12*	.01	−.02	−.03
Time 1 behavioral adjustment									
CBCL internalizing							.55***		
CBCL externalizing								.67***	
CBCL total									.69***
F	13.7***	4.4***	10.3***	8.1***	3.9***	6.5***	21.7***	30.5***	35.0***
R^2	28.9%	11.6%	23.4%	19.4%	10.4%	16.1%	41.0%	49.4%	52.9%

Note. No interaction terms were included because preliminary analyses revealed no significant interactions.
*$p < .05$. **$p < .01$. ***$p < .001$.

influential predictors of the CBCL scores at both Time 1 and Time 2. For Time 1, the 13 variables accounted for 28.9% of the variance in Internalizing Problems, 11.6% in Externalizing Problems, and 23.4% in Total CBCL problems. For Time 2, the total variance accounted for by the same variables decreased somewhat to 19.4%, 10.4%, and 16.1%, respectively. Note that three control variables, child's age at Time 1, and mother's age and education at Time 1 were also significant in predicting the children's CBCL problems.

Finally, three additional regression models were run to examine the effect of Time 1 CBCL scores on Time 2 CBCL scores. For each of the dependent variables at Time 2 (e.g., Internalizing at Time 2) the children's corresponding CBCL score at Time 1 (e.g., Internalizing at Time 1) was added to the model consisting of the previously included 13 variables. As shown in the last three columns in Table 3 the Time 1 CBCL scores significantly predicted the corresponding Time 2 CBCL scores (βs = .55, .67, and .69, ps < .001, for Internalizing, Externalizing, and Total Problems, respectively). After taking into account CBCL problems at Time 1, the remaining adversity indicators were no longer significant except for Avoidance/Refusal ($\beta = .09$, $p < .05$), which was significant in predicting Time 2 CBCL Internalizing Problems. The 14 variables accounted for 41%, 49.4%, and 52.9% of the variance in Time 2 CBCL Internalizing, Externalizing, and Total Problem scores, respectively. In these models, the only control variable that was statistically significant was the child's age at Time 1 with older children having lower CBCL problem scores.

Discussion

The central goal of this longitudinal study was to examine preschool-age adopted Chinese girls' longitudinal behavioral adjustment outcomes–as measured by the CBCL/1½–5 (Achenbach & Rescorla, 2000)–in relation to child- and family-level variables, with particular emphasis on ascertaining the relative predictive importance of (a) age at the time of adoption, (b) observable indicators of physical and psychosocial risk at the time of adoption, and (c) levels of delay across four domains based on post-adoption formal medical evaluations. The analysis was driven by the hypothesis that developmental and psychosocial indicators of pre-adoption adversity (encompassing signs and symptoms, delays at adoption, and initial adaptation to adoption) represented more proximal measures of the residual effects of pre-adoption adversity and were thus likely to predict behavioral adjustment outcomes more strongly and meaningfully than the conventionally used proxy, age at adoption. We begin the discussion by highlighting key insights emerging from the descriptive analyses.

Our findings on measures of the presumed residual effects of pre-adoption adversity confirm the general finding that physical and psychosocial problems are common in newly adopted children from China (Cohen et al., 2008; Miller & Hendrie, 2000; Nelson, 2001; Pomerleau et al., 2005; Wilson and Weaver, 2009). The use of different metrics across studies makes precise cross-study comparisons difficult, but it does appear that our study portrays a slightly more positive picture. For example, in the domain of cognitive development, where delay rates of 32% (Miller & Hendrie, 2000), 59% (Nelson, 2001), and 60–70% (Wilson et al., 2008) have been reported, we found that only 10.4% of our sample had moderate to severe delays. In the domain of gross motor development, however, the delay rate in our sample (42.2%) is closer to Miller and Hendrie's 55%–although overall motor delay rates as high as 60–89% have been reported by Wilson et al. (2008) and Nelson (2001), respectively. There are no comparable data for our Signs and Symptoms measure on which 52% of the girls in this study showed at least one of the 11 signs, or for our measures of initial adaptation to adoption, on which 54% manifested Avoidance/Refusal behaviors, and 65% showed Crying/Clinging behaviors.

The key long-term outcome measures in this study were the behavioral adjustment measures on the CBCL. Overall, these outcomes, as reflected in the Internalizing, Externalizing, and Total scores, showed strong 2-year stability (correlations ranged from .61 to .71 and from Time 1 to Time 2, about 60% of the children who scored in the borderline/clinical range remained in that range). Along with strong continuity, there was also a modest increase in overall behavior

adjustment problems. Further examination showed that the children's Internalizing Problems accounted for much of the increase. While Internalizing Problems worsened significantly over time, with a corresponding increase in the percentage of borderline/clinical cases, there was little change in Externalizing Problems. We should emphasize that these results must be interpreted in the context of the overarching finding that CBCL scores in our sample are much lower (indicating better adjustment) across the board relative to preschool-age girls in the CBCL's U.S. normative sample. This finding corroborates results from an earlier large-scale study (Tan & Marfo, 2006). Additionally, the percentage of borderline/clinical cases in Internalizing, Externalizing, and Total CBCL problems in our sample (5.8% to 8.0% for Time 1 and 6.6% to 13.9% for Time 2) is much lower than the 18% to 21% reported for preschool-age girls in the U.S. normative sample (Achenbach & Rescorla, 2000).

The regression analyses focused on the central objective of assessing the predictive importance of age at adoption relative to proximal child-level variables measuring aspects of the presumed residual effects of pre-adoption adversity: signs and symptoms, developmental delays, and initial adaptation problems as manifested in avoidance/refusal behaviors and crying/clinging behaviors. In the regression model which included corresponding Time 1 CBCL scores as predictors of Time 2 CBCL scores (e.g., Time 1 Internalizing as predictor of Time 2 Internalizing), the consistent findings were that for each of the three scales early behavioral adjustment problems were strongly predictive of later problems. The percentages of variance explained in these analyses were reasonably high: 41% for Internalizing; 49.4% for Externalizing, and 52.9% for Total. In the presence of Time 1 behavior problem scores as predictor variables, the only child-level variable to show a significant relationship with the outcomes was age at Time 1 (negatively related to Internalizing, Externalizing and Total Problems) and initial avoidance/refusal behaviors (positively related to Internalizing Problems). Thus, later behavioral adjustment outcomes were poorer for younger children, those with more avoidance/refusal behaviors, and those with poorer earlier adjustment.

In all regression analyses in which Time 1 CBCL scores were not included as predictor variables, age at adoption did not emerge as a statistically significant predictor. Instead, delayed social skills, refusal/avoidance behaviors, and crying/clinging behaviors were the most prominent in terms of the magnitude and the frequency with which they were significantly related to behavioral adjustment outcomes. There are important differences in the predictive importance of these child-level variables that are worth highlighting. Signs and symptoms were no longer significantly related to the CBCL problems in the presence of other predictor variables. Delayed social skills, Avoidance/Refusal behaviors, and Crying/Clinging behaviors had the most consistent predictive relationship with Time 1 and Time 2 behavioral adjustment problems. Thus for prediction of longer-term (Time 2) outcomes, delayed social skills, problems in both areas of initial adaptation, and chronological age (with a negative relationship), emerged as key variables.

These findings provide empirical support for our conceptual argument that while age at adoption has been used extensively in adoption research (domestic as well as international), it is at best only partially useful or appropriate as a proxy measure of the magnitude of the effects of pre-adoption adversity. Although our bivariate correlation analysis indicated that age at adoption was significantly (though weakly) related to Time 2 CBCL outcomes, it did not have a significant predictive relationship with these outcomes when considered along with our measures of the residual effects of pre-adoption adversity. This nuance in our findings may serve to contextualize the equivocal findings reported to date on the importance of age at adoption in international adoption research. While some studies have found children adopted at older ages to show more later adjustment problems (e.g., Fisher et al., 1997; Gunnar, van Dulmen, & International Adoption Research Team, 2007; Morison & Ellwood, 2000; Sharma, McGue, & Benson, 1996; Verhulst, Althaus, & Versluis-den Bieman, 1990, 1992), others have failed to establish this relationship (e.g., Andresen, 1992; Brand & Brinich, 1999; Cohen et al., 2008; Rojewski, Shapiro, & Shapiro, 2000; Verhulst & Versluis-den Bieman, 1995). None of the earlier studies included comprehensive measures of the residual effects of pre-adoption adversity in the prediction models. Our findings suggest that age at adoption may appear important only in the absence of consideration of more proximal measures of the adverse effects of institutionalization. This explanation deserves further examination in future research.

The present study also contributes new insights on the differential effects that specific developmental delays might have on behavioral adjustment outcomes. In earlier analyses of aspects of our Time 1 data (e.g., Tan, Marfo, & Dedrick, 2007), developmental delays in all domains were coded into one composite score, precluding any differentiated inferences about the magnitude of influence associated with individual domains. By disaggregating the delay scores into the four component domains (gross motor, fine motor, social, and cognition), this study has shown that delay in social skills is more prominently implicated in the determination of behavioral adjustment outcomes than the other domains. If confirmed in future studies, this finding would have important implications for post-adoption services. Specifically, it would underscore the need for comprehensive assessment across multiple domains to permit more targeted interventions in the domains most closely associated with the anticipated behavioral outcomes.

Research employing international adoptions as a methodological tool in the study of early experience and later outcomes faces one stark challenge worth noting here. Data on the nature and magnitude of reproductive risk factors present at the time of institutionalization or the extent of deprivation during the period of institutionalization remain unavailable to researchers because they are either non-existent at China's Child Welfare Institutes or inaccessible for bureaucratic reasons. In the face of this perennial reality, measures of the residual effects of such adversity at the time of adoption are critically important to the viability of the new generation of "early experience" research. In this regard, further refinements and/or independent validations of the measures developed and employed in the present study should advance the field even further. Particularly needed are studies in which the data on these measures are gathered prospectively.

Returning to the broader picture regarding the prevalence of behavioral adjustment problems, the present study constitutes the second large-scale data set in the China Adoption Research Program (Dedrick, Tan, & Marfo, 2008; Tan, Dedrick, & Marfo, 2007; Tan & Marfo, 2006) to present a profile suggesting that girls adopted from China have relatively comparable or even slightly better behavioral adjustment relative to similar-age girls in the U.S. CBCL normative sample (see also Tan & Marfo, 2006). This profile contrasts sharply with what has been typically reported in studies of internationally adopted children with a history of institutionalization (e.g., Kreppner et al., 2007; Morison et al., 1995; Rutter et al., 2004; Verhulst et al., 1990). As has been argued elsewhere (Tan, Dedrick, & Marfo, 2007), part of the explanation for the favorable profile of adjustment in adopted Chinese girls may lie in attributes that set these children apart from institutionalized children adopted from other countries, particularly Romania and Russia. China's Child Welfare Institutes appear to offer better childrearing environments compared to Romanian institutions. Additionally, epidemiological data (e.g., Davies & Bledsoe, 2005; Grjibovski, Brygen, Svartbo, & Magnus, 2004; Lam, To, Duthie, & Ma, 1992) suggest that the incidence of prenatal exposure to the effects of drug, alcohol, and cigarette use is lower in China than in Russia. Considering the known impact of these threats to pre-natal development, the above epidemiological evidence suggests that children entering institutional settings in China may

do so with lesser developmental vulnerability. From a transactional perspective (e.g., Sameroff & Fiese, 2000), this reduced vulnerability may be serving to moderate the ultimate effects of institutional deprivation on children adopted from Chinese institutions.

Also plausible is the proposition that temperamental qualities may place adopted Chinese children in a position of relative advantage. Kagan, Kearsley, and Zelazo (1979) suggest, for example, that Chinese children have easier temperaments than Caucasian children. An easier temperament might serve as another protective factor moderating not only the effects of pre-adoption adversity but also the stresses accompanying the transition to adoption. Converging evidence from the literature offers some support for this explanation. Research conducted in several countries has shown that adopted children of Asian origin have more favorable outcomes than children adopted elsewhere (e.g., Clark & Hanisee, 1982; Dalen, 2001; Feigelman & Silverman, 1984; Stams, Juffer, Rispens, & Hoksbergen, 2000).

The findings reported in this paper should be interpreted with caution. While the study has the advantage of employing a longitudinal design and a large sample (with participating families from all regions of the United States), the study did not utilize national probability sampling in the selection of participating families. Consequently, unqualified generalizations of the findings to the larger population of adopted Chinese girls may not be warranted. Secondly, while the study's methodological innovations in the measurement of the physical and behavioral manifestations of early adversity are likely to be seen as timely contributions to the field, the data presented here are based solely on parental retrospective reports. Such reports yield rich and informative data, but complementary measures from alternative sources (such as physicians and other developmental professionals) can further strengthen the validity of some of the measures (e.g., developmental delay at the time of adoption). Additionally, while we relied on parents to report what medical professionals had told them about their children's delay status, we did not gather data on what types of measures were used in the evaluations or how familiar the medical professionals were with internationally adopted children. There are no clear guidelines or training standards for professionals to assess internationally adopted children's developmental status. In the face of these challenges, researchers should continue to fine-tune measures in this area. As large numbers of children continue to be adopted internationally by American families, a more standardized post-adoption evaluation protocol might not only benefit the field of medical practice but also the service needs of the children. Finally, since the number of boys in our sample was too small to be included in the analyses, we caution that the findings of the study have relevance only for issues pertaining to girls adopted from China. The extent to which our findings are applicable to boys is an important question to be addressed in future research.

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References

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA Preschool Forms & Profiles.* Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

Andresen, I. L. K. (1992). Behavioral and school adjustment of 12–13-year old internationally adopted children in Norway: A research note. *Journal of Child Psychology and Psychiatry*, *33*, 427—439.

Bayley, N. (1993). *Bayley Scales of Infant Development*, 2nd Ed. San Antonio, TX: The Psychological Corporation.

Beckett, C., Maughan, B., Rutter, M., Castle, J., Colvert, E., Groothues, C., et al. (2006). Do the effects of early severe deprivation on cognition persist into early adolescence? Findings from the English and Romanian adoptees study. *Child Development*, *77*, 696—711.

Beckett, C., Maughan, B., Rutter, M., Castle, J., Colvert, E., Groothues, C., et al. (2007). Scholastic attainment following severe early institutional deprivation: A study of children adopted from Romania. *Journal of Abnormal Child Psychology*, *35*, 1063—1073.

Benoit, T., Jocelyn, L., Moddemann, D., & Embree, J. (1996). Romanian adoption: The Manitoba experience. *Archives of Pediatric and Adolescent Medicine*, *150*, 1278—1282.

Brand, A. E., & Brinich, P. M. (1999). Behavior problems and mental health contacts in adopted, foster, and nonadopted children. *Journal of Child Psychology and Psychiatry*, *40*, 1221—1229.

Bricker, D., Squires, J., & Mounts, M. A. (1995). *Ages and Stages Questionnaire*. Baltimore, MD: Paul H. Brookes.

Castle, J., Groothues, C., Bredenkamp, D., Beckett, C., O'Conner, T., Rutter, M., et al. (1999). Effects of qualities of early institutional care on cognitive attainment. *American Journal of Orthopsychiatry*, *69*, 427—437.

Clark, E. A., & Hanisee, J. (1982). Intellectual and adaptive performance of Asian children in adoptive American settings. *Developmental Psychology*, *18*, 595—599.

Cohen, N. J., Lojkasek, M., Zadeh, Z. Y., Pugliese, M., & Kiefer, H. (2008). Children adopted from China: A prospective study of their growth and development. *Journal of Child Psychology and Psychiatry*, *49*(4), 458—468.

Croft, C., Beckett, C., Rutter, M., Castle, J., Colvert, E., Groothues, C., et al. (2007). Early adolescent outcomes of institutionally-deprived and non-deprived adoptees. II: Language as a protective factor and a vulnerable outcome. *Journal of Child Psychology and Psychiatry*, *48*, 31—44.

Dalen, M. (2001). School performances among internationally adopted children in Norway. *Adoption Quarterly*, *5*(2), 39—58.

Davies, J. K., & Bledsoe, J. M. (2005). Prenatal alcohol and drug exposures in adoption. *Pediatric Clinics of North America*, *52*(5), 1369—1393.

Dedrick, R. F., Tan, T. X., & Marfo, K. (2008). Factor structure of the child behavior checklist/6-18 in a sample of girls adopted from China. *Psychological Assessment*, *20*(1), 70—75.

Feigelman, W., & Silverman, A. R. (1984). The long-term effects of transracial adoption. *Social Service Review*, *8*, 588—602.

Fisher, L., Ames, E. W., Chisholm, K., & Savoie, L. (1997). Problems reported by parents of Romanian orphans adopted to British Columbia. *International Journal of Behavioral Development*, *20*, 67—82.

Grjibovski, A., Brygen, L. O., Svartbo, B., & Magnus, P. (2004). Housing conditions, perceived stress, smoking, and alcohol: Determinants of fetal growth in Northwest Russia. *Acta Obstet Gynecology of Scandinavia*, *83*, 1159—1166.

Groza, V., & Ryan, S. D. (2002). Pre-adoption stress and its association with child behavior in domestic special needs and international adoptions. *Psychoneuroendocrinology*, *27*, 181—197.

Gunnar, M. R., Morison, S. J., Chisholm, K., & Schuder, M. (2001). Salivary cortisol levels in children adopted from Romanian orphanages. *Development and Psychopathology*, *13*, 611—628.

Gunnar, M. R., van Dulmen, M. H. M., & the International Adoption Project Team (2007). Behavior problems in post-institutionalized internationally adopted children. *Development and Psychopathology*, *19*, 129—148.

Kagan, J., Kearsley, R. B., & Zelazo, P. R. (1979). *Infancy: Its place in human development* (pp. 260—293). Cambridge, MA. London, England: Harvard University Press.

Kreppner, J. M., Rutter, M., Beckett, C., Castle, J., Colvert, E., Groothues, C., et al. (2007). Normality and impairment following profound early institutional deprivation: A longitudinal follow-up into early adolescence. *Developmental Psychology*, *43*, 931—946.

Lam, S. K., To, W. K., Duthie, S. J., & Ma, H. K. (1992). The effect of smoking during pregnancy on the incidence of low birth weight among Chinese parturients. *Australia & New Zealand Journal of Obstetrics and Gynaecology*, *32*, 125—128.

Marcovitch, S., Goldberg, S., Gold, A., Washington, J., Wasson, C., Krekewich, K., et al. (1997). Determinants of behavioral problems in Romanian children adopted in Ontario. *International Journal of Behavioral Development*, *20*, 17—31.

Miller, L. C., & Hendrie, N. W. (2000). Health of children adopted from China. *Pediatrics*, *105*(6), 76—91.

Morison, S. J., Ames, E. W., & Chisholm, K. (1995). The development of children adopted from Romanian orphanages. *Merrill-Palmer Quarterly*, *41*, 411—430.

Morison, S. J., & Ellwood, A. (2000). Resiliency in the aftermath of deprivation: A second look at the development of Romanian orphanage children. *Merrill-Palmer Quarterly*, *46*, 717—737.

Nelson, R. (2001). *The developmental status and expressive behavior of ex-institutionalized female Chinese infants: The early months*. Unpublished doctoral dissertations, DePaul University.

Pomerleau, A., Malcuit, G., Chicoine, J., Seguin, R., Belhumeur, C., Germain, P., et al. (2005). Health status, cognitive and motor development of young children adopted from China, East Asia, and Russia across the first 6 months after adoption. *International Journal of Behavioral Development*, *29*(5), 445—457.

Rojewski, J. W., Shapiro, M. S., & Shapiro, M. (2000). Parental assessment of behavior in Chinese adoptees during early childhood. *Child Psychiatry and Human Development*, *31*(1), 79—96.

Rutter, M., & O'Connor, T. G.the English and Romanian Adoptees (ERA) Study Team. (2004). Are there biological programming effects for psychological development? Findings from a study of Romanian adoptees. *Developmental Psychology*, *40*, 81—94.

Rutter, M., & the English and Romanian Adoptees (ERA) Study Team (1998). Developmental catch-up, and delay, following adoption after severe global early deprivation. *Journal of Child Psychology and Psychiatry*, *39*, 465—476.

Sameroff, A. J., & Fiese, B. H. (2000). Transactional regulation: The developmental ecology of early intervention. In J. P. Shonkoff, & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (pp. 135—159). New York, NY: Cambridge University Press.

Schafer, D., & Moersch, M. (1981). *The early intervention development profile: Developmental programming for infants and young children.* Ann Arbor, MI: University of Michigan Press.

Sharma, A. R., McGue, M. K., & Benson, P. L. (1996). The emotional and behavioral adjustment of United States adopted adolescents: Part II. Age at adoption. *Children & Youth Services Review*, *18*(1–2), 101−114.

Stams, G. J. M., Juffer, F., Rispens, J., & Hoksbergen, R. A. C. (2000). The development and adjustment of 7-year-old children adopted in infancy. *Journal of Child Psychology and Psychiatry*, *41*, 1025−1037.

Tan, T. X., Dedrick, R. F., & Marfo, K. (2007). Factor structure and clinical implications of Child Behavior Checklist/1.5-5 ratings in a sample of girls adopted from China. *Journal of Pediatric Psychology*, *32*, 807−818.

Tan, T. X., & Marfo, K. (2006). Parental ratings of behavioral adjustment in two samples of adopted Chinese girls: Age-related versus socio-emotional correlates and predictors. *Journal of Applied Developmental Psychology*, *27*, 14−30.

Tan, T. X., Marfo, K., & Dedrick, R. F. (2007). Special needs adoption from China: Child characteristics and behavioral adjustment. *Children and Youth Services Review*, *29*, 1269−1285.

The St. Petersburg-USA Orphanage Research Team. (2008). The effects of early socio-emotional and relationship experience on the development of young orphanage children. *Monographs of the Society for Research in Child Development*, *73*(3) (Serial No. 291).

United States Department of State (2010). *Immigrant visas issued to orphans coming to U.S.* (Retrieved from http://www.adoption.state.gov/news/total_chart.html on January 5, 2010).

Verhulst, F. C., Althaus, M., & Versluis-den Bieman, H. J. M. (1990). Problem behavior in international adoptees: II. Age at placement. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*(1/2), 104−111.

Verhulst, F. C., Althaus, M., & Versluis-den Bieman, H. J. M. (1992). Damaging backgrounds: Later adjustment of international adoptees. *Journal of the American Academy of Child and Adolescent Psychiatry*, *31*, 518−524.

Verhulst, F. C., & Versluis-den Bieman, H. J. M. (1995). Developmental course of problem behaviors in adolescent adoptees. *Journal of the American Academy of Child and Adolescent Psychiatry*, *34*(2), 151−159.

Weitzman, C. C. (2003). Developmental assessment of the internationally adopted child: Challenges and rewards. *Clinical Child Psychology and Psychiatry*, *8*, 303−313.

Weitzman, C. C., & Avni-Singer, A. (2005). Building the bonds of adoption: From separation and deprivation towards integration and continuity. *Zero to Three*, *25*, 14−20.

Wilson, S. L., & Weaver, T. L. (2009). Follow-up of developmental attainment and behavioral adjustment for toddlers adopted internationally into the USA. *International Social Work*, *52*, 679−684.

Wilson, S. L., Weaver, T. L., Cradock, M. M., & Kuebli, J. E. (2008). A preliminary study of the cognitive and motor skills acquisition of young international adoptees. *Children and Youth Services Review*, *30*, 585−596.