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## Early Elementary School Adjustment of Maltreated Children in Foster Care: The Roles of Inhibitory Control and Caregiver Involvement

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### Abstract

In this study, 85 maltreated foster children and 56 nonmaltreated community children (*mean age* = 3- to 6-years-old) were assessed across kindergarten and first grade to examine the hypothesis that inhibitory control and caregiver involvement mediate associations between a history of maltreatment and foster placement and early school adjustment. Specifically, academic and social-emotional competence were evaluated. The maltreated foster children performed more poorly in academic and social-emotional competence. Inhibitory control fully mediated the association of maltreatment and foster care placement with academic competence, whereas inhibitory control and caregiver involvement mediated their association with social-emotional competence. The results suggest that inhibitory control and caregiver involvement might be promising targets for school readiness interventions for foster preschoolers.

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Maltreated foster children often display difficulties in a number of cognitive and psychosocial domains (Leslie et al., 2000; Pears & Fisher, 2005), which might impinge upon success in school. Thus, it is not surprising that many of these children have scholastic difficulties, including high rates of special education placement, academic failure, and school dropout (Blome, 1997; Courtney & Dworky, 2006; Geenen & Powers, 2006; Goerge, Van Voorhis, Grant, Casey, & Robinson, 1992; Smithgall, Gladden, Howard, Goerge, & Courtney, 2004). However, few studies have explored how foster children fare at elementary school entry, a critical developmental milestone. In the general population, kindergarten and first grade academic and social-emotional performance predict trajectories of school and psychosocial adjustment across later elementary and middle school grades (Duncan et al., 2007; Lesaux, Rupp, & Siegel, 2007; McClelland, Acock, & Morrison, 2006; Nagin & Tremblay, 2001). Additionally, successful adjustment in the early school years is linked to educational attainment and avoidance of psychosocial problems in adulthood

(Fothergill et al., 2008). Understanding foster children's early school adjustment might be pivotal in preventing negative outcomes.

The current study had two primary goals. First, we sought to explore whether disparities in school adjustment can be observed in maltreated foster children as early as kindergarten and first grade. Second, we sought to identify factors that mediated the association between a history of maltreatment and foster placement and early school adjustment.

### **Components of Early School Adjustment**

Converging evidence suggests that successful school achievement in the early grades requires both academic and social-emotional competence (Blair, 2002; Peth-Pierce, 2000; Raver, 2002). Early academic competence includes literacy skills such as language and reading abilities, which are predictive of later academic achievement (Duncan et al., 2007; NICHD Early Child Care Research Network, 2005). For example, Duncan and colleagues showed that early language and reading abilities positively predict achievement in reading and math up to 9 years later. Additionally, better language skills appear to serve a protective function for children exposed to risk factors that might otherwise lead to poor school adjustment (Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006). Conversely, early academic difficulties, particularly in language and reading, appear to predict trajectories of increasing academic and social-emotional problems across the school years (Chatterji, 2006; Hooper, Roberts, Zeisel, & Poe, 2003).

Social-emotional competence comprises three interrelated sets of skills: prosocial behaviors, emotion regulation, and behavior regulation. Key prosocial behaviors include the abilities to enter peer groups, to share materials with others, to cooperate, and to maintain social interactions. These skills predict positive peer and teacher relationships, which are linked to higher classroom participation and achievement (Ladd, Birch, & Buhs, 1999; Pianta & Stuhlman, 2004). Emotion regulation involves a child's abilities to modulate negative emotions (e.g., frustration) and to control positive emotions (e.g., exuberance) so that they do not disrupt academic performance and social relationships (Blair, 2002; Graziano, Reavis, Keane, & Calkins, 2007). Better emotion regulation is linked to higher academic achievement and better social skills in school within grades (Graziano et al., 2007; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003) and across grades (Newman, Noel, Chen, & Mastopoulos, 1998; Trentacosta & Izard, 2007). Behavior regulation involves a child's abilities to focus on schoolwork, to avoid disrupting classroom activities, and to make successful transitions between activities. Recent studies have linked greater behavior regulation in kindergarten and first grade to higher academic achievement concurrently (Howse, Lange, Farran, & Boyles, 2003) and longitudinally through middle school (Duncan et al., 2007; McClelland et al., 2006). Although these three components of social-emotional competence are conceptually distinct, they have been shown to be strongly intercorrelated (Graziano et al., 2007; Trentacosta & Izard, 2007).

### **Maltreatment and Foster Placement and Early School Adjustment**

School achievement in foster children has been investigated previously (Blome, 1997; Courtney & Dworksy, 2006; Geenen & Powers, 2006; Goerge et al., 1992; Smithgall et al., 2004). However, these studies were generally concentrated on children in the middle elementary grades and higher. Few studies have been focused on foster children in early elementary school. Additionally, because these studies were generally based on archival record data, most only involved the assessment of academic functioning. A number of researchers have examined academic and social-emotional competence in maltreated children in general (e.g., Anthonyamy & Zimmer-Gembeck, 2007; Kurtz, Gaudin, Wodarski, & Howing, 1993; Veltman & Browne, 2001). This line of research is relevant to

foster children because the majority of young foster children come into care due to maltreatment. However, foster children have also experienced multiple caregiver disruptions. Consequently, maltreated foster children might exhibit differences in school adjustment compared to maltreated children in general. Given the importance of adjustment at school entry to later school functioning and psychosocial outcomes (Duncan et al., 2007; Fothergill et al., 2008), understanding whether maltreated foster children show early deficits in academic and social-emotional competence is critical to the development of targeted interventions to improve school outcomes for these children.

### **Potential Mediational Effects on Early School Adjustment in Maltreated Foster Children**

In addition to identifying maltreated foster children's deficits in early school adjustment, understanding the factors that mediate the association between a history of maltreatment and foster placement and school adjustment is essential to preventive intervention efforts. Prior research results have suggested at least two mechanisms that leave maltreated foster children vulnerable to difficulties in school: inhibitory control and caregiver involvement. Inhibitory control, a cognitive process that falls under the rubric of executive functioning, is the capacity to voluntarily inhibit or regulate prepotent attentional or behavioral responses (Casey, Tottenham, & Fossella, 2002). It has an extended developmental trajectory and changes over time from being an externally driven process to an internalized ability (Kochanska, Coy, & Murray, 2001). Because young children are reliant on their caregivers for self-control, disruptions and inconsistencies in the early caregiving environment, such as maltreatment and foster placement, are likely to have deleterious effects on later inhibitory control. Past research has shown that caregiver disruptions have negative effects on inhibitory control in general and foster care populations. In a recent study of a community sample of preschool-aged children, Lengua, Honorado, and Bush (2007) found that the number of household moves predicted inhibitory control abilities. Lewis, Dozier, Ackerman, and Sepulveda (2007) showed that adopted children who had experienced multiple prior foster placements performed significantly worse on an inhibitory control task than nonadopted community children and adopted children who had experienced only one prior foster placement. Additionally, executive functions, particularly inhibitory control, have been linked to harsh parenting and maltreatment (Beers & DeBellis, 2002; Valiente, Lemery-Chalfant, & Reiser, 2007), suggesting that foster children's histories of maltreatment might also impinge on their inhibitory control.

Maltreated foster children's potential deficits in inhibitory control suggest a pathway through which maltreatment and foster care placement might affect school outcomes. Prior research has shown that early inhibitory control is central to school success. Specifically, better inhibitory control in the preschool period has been linked to better academic and social functioning in first grade (Blair & Razza, 2007; NICHD Early Child Care Research Network, 2003). Additionally, inhibitory control appears to be positively associated with concurrent feelings of school liking in later elementary grades (Valiente, Lemery-Chalfant, & Castro, 2007). Finally, children's inhibitory control appears to partially mediate the association between family environment and children's readiness for kindergarten (NICHD Early Child Care Research Network, 2003), suggesting that inhibitory control might provide a link between early experiences and school outcomes.

Maltreated foster children are likely to be at a disadvantage in terms of another important precursor of success in school: caregiver involvement. Caregiver involvement in schooling (e.g., promotion of literacy and homework activities at home, assistance in organizing school materials, direct involvement in classroom activities, and contact with teachers and school personnel) has been shown to be a significant predictor of academic achievement across studies (Jeynes, 2005). It has been associated with higher grades, better attitudes toward schoolwork, greater participation in classroom learning activities, higher attendance

rates, fewer placements into special education, fewer suspensions, and greater educational attainment over time (Barnard, 2004; Christenson, 1999).

The majority of young foster children have experienced abusive and neglectful environments in their families of origin. Although there are no prior studies of the school involvement of abusive parents, the results from one study suggest that parents might be less involved in schooling when the family is experiencing difficult life circumstances (Lamb-Parker et al., 2001). Additionally, once placed into foster care, the children often experience multiple caregiver changes. Pears and Fisher (2005) showed that preschool-aged maltreated foster children had experienced an average of 3.47 transitions. The caregiver changes associated with foster placements are likely to interfere with caregiver involvement in schooling for several reasons. First, the caregiver might not have adequate information about the child's academic history. For example, one study found that information on past academic performance was missing from 53% of foster children's school records (Parrish et al., 2001). Second, the caregiver might not have an opportunity to become involved in schooling if the child is in the home for only a limited period of time. In 2005, half of all children exiting foster care had been in their placements between 1 and 11 months (Child Welfare Information Gateway, 2007). Given the potential barriers to foster caregivers' involvement in schooling, it is not surprising that 65% of foster children in high school reported that their caregivers had never attended a teacher conference, 73% reported that their caregivers had never visited their class, and 70% reported that their caregivers had never volunteered at school (Blome, 1997). Though a limited number of studies have explored factors related to caregiver involvement in this population, caregiver involvement at school entry and its role as a mediator in the association between maltreatment and foster care placement and early school adjustment have not yet been examined.

### Goals of the Study

As is noted above, the purpose of this study was two-fold. The first goal was to explore whether deficits in school adjustment can be observed as early as kindergarten and first grade in maltreated foster children. To accomplish this, maltreated foster children were compared to nonmaltreated children living with their biological parents. It was hypothesized that the maltreated foster children would exhibit lower scores on academic and social-emotional competence than their nonmaltreated peers. The second goal was to use longitudinal data to test the hypotheses that the pathways between a history of maltreatment and foster placement and poor early school adjustment (i.e., low academic and social-emotional competence) would be mediated by the following: child inhibitory control during preschool and caregiver involvement at kindergarten entry. Potential confounding variables, including the children's age and general cognitive ability, were controlled in the path model. School characteristics (e.g., SES composition and class size) can affect school adjustment (Konstantopoulos, 2006) and were thus included in the model as control variables. Although little is known about the school contexts of foster children, one study found that foster children were less likely to attend magnet schools and were disproportionately concentrated in the lowest achieving schools (Smithgall et al., 2004).

## Method

### Participants

The participants in this study were a subsample of children included in an efficacy trial to evaluate a treatment foster care program for preschool-aged children. The entire sample included a foster care (FC) group of 117 maltreated foster children and a community comparison (CC) group of 60 age- and SES-matched, nonmaltreated children living with their biological families. For the FC group, children between the ages of 3 and 6 entering

new foster placements were referred to the study through the local child welfare system. The inclusion criteria for the FC group specified placement in a nonrelative foster home, an expectation of remaining in foster care for at least 3 months, and English as the primary language of the child and foster parent. Staff members contacted the child's caseworker (the legal guardian while the child is in care) and requested consent for the child to participate in the study. Upon receiving caseworker consent, staff members then contacted the foster parent to invite him/her to participate. For a child to be successfully recruited, the caseworker and foster parent had to consent to participate.

The CC group was recruited via flyers posted at local supermarkets, daycare centers, and Head Start classrooms and through advertisements in local newspapers and newsletters. The CC families were included in the study if the child had lived consistently with at least one biological parent, household income was no more than \$30,000, parental education level was less than a 4-year college degree, and the family had no prior involvement with the child welfare system.

The FC and CC children were 3 to 6 years old when they were recruited to participate in the study for a period of 24 months. Because the mean age of the children at the baseline assessment was 4.46 years ( $SD = 0.81$ ), most children were not in school at study entry. Data on performance in kindergarten and first grade were collected for 85 FC and 56 CC children who were still participating in the study when they entered those grades. Of the 36 children (32 FC and 4 CC) for whom school data were not available, 28 (26 FC and 2 CC) discontinued their participation in the study before they entered school, 5 were too young to have entered school by the end of the 24-month assessment period (4 FC and 1 CC), 2 were homeschooled (1 FC and 1 CC), and 1 FC child was in second grade by the time that school data were collected. Children for whom school data were not available did not differ significantly on age, sex, ethnicity, or general cognitive functioning from those for whom the data were available.

Although all of the 85 FC children were in foster care at study entry, 12 children had been permanently placed with biological relatives, and 8 children had been adopted by nonrelatives when the school assessments were conducted. There were no differences between these children and the other FC children on any of the study variables; thus, all of the children were retained in the FC group. As is noted above, all of the FC children were part of a larger efficacy trial to evaluate a treatment foster care program (Multidimensional Treatment Foster Care for Preschoolers; Fisher, Gunnar, Chamberlain, & Reid, 2000) and were assigned to intervention or comparison groups at study entry. (The CC children were not randomized to different conditions.) Maltreated foster children from the intervention ( $n = 45$ ) and control ( $n = 40$ ) groups were combined in the present sample because there were no mean differences between the two foster care groups on any of the variables used in the present study (either the individual scores or the composites) and because correlational analyses with treatment status as a covariate did not reveal any experimental effects.

The FC and CC groups did not differ on mean child age, gender, or ethnicity. Mean age at the first school assessment was 5.89 years ( $SD = 0.47$ ) in the FC group and 5.81 years ( $SD = 0.49$ ) in the CC group. Boys comprised 53% of the FC group and 54% of the CC group. The ethnicity breakdown of the FC group was: 85% European American, 1% African American, 8% Latino, and 6% Native American. The ethnicity breakdown of the CC group was: 79% European American, 5% African American, 7% Latino, 7% Native American, and 2% Pacific Islander. The study included 22 sibling dyads (12 FC and 10 CC) and 3 sibling tetrads (3 FC).

The FC children had experienced an average of 1.84 placements, 3.73 transitions between placements, and 164 days in care prior to study entry. All of the FC children had histories of maltreatment. Child welfare case records coded using the Maltreatment Classification System (Barnett, Manly, & Cicchetti, 1993) revealed that the children had experienced physical abuse (36%), sexual abuse (27%), physical neglect (81%), supervisory neglect (87%), and emotional maltreatment (89%). No CC children had been reported for child maltreatment by study entry (as verified by a search of child protective service records).

## Procedure

As is noted above, the children entered the study between 3 and 6 years of age and participated in the study for 24 months. If the children entered school during the time that they participated in the study, school data were collected in the fall and spring of their kindergarten year and in the spring of their first-grade year. Some of the children had attended kindergarten and first grade by the end of the 24 months and participated in all of the school assessments. Some children, however, were young enough at study entry that they only participated in the kindergarten assessments, whereas some children were old enough at study entry that they participated only in the kindergarten spring and/or first-grade assessments. Thus, not every child had data for all of the school assessment points. One hundred twenty five children (89%) had data for the kindergarten fall assessment, 107 (76%) had data for the kindergarten spring assessment, and 96 (68%) had data for the first-grade spring assessment. Sixty-nine children (49%) participated at all three assessment points, 49 children (35%) participated at two assessment points, and 23 children (16%) participated at one assessment point. To maximize the number of children included in the analyses and the data available for each child, measures were combined across the kindergarten and first grade assessments.

In addition to the school assessments, all of the children and their families completed laboratory-based measures and questionnaires at 3-month intervals over the 24 months of the study. At the baseline assessment (study entry), the children completed laboratory-based measures to assess inhibitory control and general cognitive functioning. At the 3-month assessment, the caregivers completed a questionnaire measure of inhibitory control. Because the children entered the study at different ages, the time between the baseline assessment and the first school assessment varied ( $M = 17$  months,  $SD = 9$  months).

For the current study, individual scales and multimethod, multiagent composites were created according to Patterson and Bank's (1986) method and were examined in analyses. All scales and composites had to show an internal reliability of .60 or higher (standardized alpha), and all items in a scale or composite had to show an item-total correlation of .20 or higher.

## Group Status

In the current study, a history of maltreatment and foster placement was represented by a dichotomous variable. The FC children were coded as 1 (*history of maltreatment and foster placement*), whereas the CC children were coded as 0 (*no history of maltreatment or foster placement*).

## School Adjustment

**Academic Competence**—This aspect of school adjustment was assessed via a composite measure of teacher report and school records data. Teachers rated the children's performance in language, language comprehension, articulation, and self-help abilities on a scale of 1 (*superior*) to 5 (*delayed*) as a measure of the children's language and learning skills. The scores were reverse coded: higher scores indicated higher skill. The language and

learning skills scale showed good internal consistency at all of the school assessments. Reliability information for all school adjustment measures across time is shown in Table 1. Additionally, we collected information from school records on the number of special academic services received during kindergarten and first grade. These special services were classified according to the following categories: special education in the general classroom, special education in a self-contained classroom, and Chapter I/Title I services. The number of special academic services was reversed scored. The language and learning skills scales were combined across time points ( $\alpha = .77$ ), as were the numbers of special academic services received ( $r = .35, p < .05$ ). The resulting language and learning skills and number of academic services scores were significantly correlated ( $r = .51, p < .001$ ), and these scores were standardized and combined to produce the academic competence composite score. Higher values represent better academic competence.

**Social-Emotional Competence**—This composite score was composed of three domain scores—prosocial behaviors, emotion regulation, and behavior regulation—and was assessed using four teacher-report measures and one child-report measure. The Teacher Social Competence Scale (Conduct Problems Prevention Research Group, 1995) is a 12-item measure that assesses children’s prosocial behaviors/communication skills and emotion regulation. The Loneliness and Social Dissatisfaction Questionnaire for Young Children—Teacher Version (Cassidy & Asher, 1992) is a 12-item instrument designed to assess child behavior on four dimensions: aggression, disruptiveness, prosocial behavior, and withdrawal. The Walker-McConnell Scales of Social Competence and School Adjustment (Walker & McConnell, 1988) is a 45-item teacher-report instrument measuring teacher-preferred behaviors, peer-preferred behaviors, and school adjustment. The teachers also completed the Emotion Regulation Checklist (Shields & Cicchetti, 1997), a 27-item questionnaire that measures emotion regulation and lability/negativity. The children completed the Seattle Personality Questionnaire (Greenberg & Lengua, 1995), a 44-item measure that forms eight subscales, including the conduct problems subscale.

**Prosocial behavior:** This score was comprised of three scales: the 6-item Prosocial Behaviors/Communication Skills subscale of the Teacher Social Competence Scale, the 3-item Prosocial Behaviors subscale of the Loneliness and Social Dissatisfaction Questionnaire for Young Children—Teacher Version, and the 17-item Peer-Preferred Behaviors subscale of the Walker-McConnell Scales of Social Competence and School Adjustment. At each time point, the individual scales were standardized and averaged to form the prosocial behavior domain score (see Table 1). These scores were then averaged across time points ( $\alpha = .78$ ).

**Emotion regulation:** This score was comprised of two scales: the 6-item Emotion Regulation subscale of the Teacher Social Competence Scale and the 8-item Emotion Regulation subscale of the Emotion Regulation Checklist. The scales were significantly positively correlated at each time point (see Table 1). Thus, the scales were standardized and averaged at each time point and then averaged across time points ( $\alpha = .80$ ).

**Behavior regulation:** This score was comprised of four subscales: the 3-item Aggression and 3-item Disruptiveness subscales of the Loneliness and Social Dissatisfaction Questionnaire for Young Children—Teacher Version, the 15-item Lability/Negativity subscale of the Emotion Regulation Checklist, and the 8-item Conduct Problems subscale of the Seattle Personality Questionnaire. Within each time point, the scales were standardized and averaged, producing internally consistent domain scores (see Table 1). These scores, which were averaged across time points ( $\alpha = .83$ ), were reversed scored: higher scores reflected better behavior regulation.

The goal in producing separate social-emotional domain scores was to use the individual scores in the analyses. However, in preliminary analyses, the domain scores showed strong associations with one another ( $r = .75-.92$ ). To avoid problems of multicollinearity in the analyses, the prosocial behaviors, emotion regulation, and behavior regulation domain scores were averaged to produce an overall social-emotional competence composite score. The composite showed high internal consistency ( $\alpha = .96$ ).

**Mediators of the Effects of Maltreatment and Foster Care Placement on School Adjustment Inhibitory Control**—Inhibitory control was assessed via laboratory child assessments and caregiver reports. The laboratory assessments included the modified Stroop task (Gerstadt, Hong, & Diamond, 1994), which is associated with other measures of inhibitory control (Carlson & Moses, 2001). The children were instructed to say “night” whenever they saw a card with a yellow sun on a white background and to say “day” whenever they saw a card with a white moon on a black background. Sixteen cards were presented in a pseudorandom order. The mean correct score was used in analyses. Children also completed the Dimensional Change Card Sort task (adapted from Frye, Zelazo, & Palfai, 1995), which correlates well with other inhibitory control measures (Carlson & Moses, 2001). In this task, the children were asked to sort a series of cards first according to one criterion and then according to another criterion, which required inhibition of the tendency to respond according to the first criterion. For three of the postswitch trials (after the sorting criterion changed), the cards were incompatible with the preswitch rules. The mean correct score for the incompatible trials was used in analyses. The attention/executive function domain of the NEPSY (Korkman, Kirk, & Kemp, 1998) was also used. For 3- and 4-year-olds, this domain includes two subscales: Visual Attention and Statue. (The NEPSY was not administered to children who were over the age of 5 at the baseline assessment [ $n = 40$ ]; thus, this score was not included in the composite for these children.) The caregiver reports were assessed using the Inhibitory Control and Attention Focusing scales of the Children’s Behavior Questionnaire (Rothbart, Ahadi, Hershey, & Fisher, 2001), which assess behavior and attention regulation, respectively. The laboratory measures and caregiver ratings were standardized and averaged to form the inhibitory control composite ( $\alpha = .68$ ).

**Caregiver Involvement in Schooling**—Caregiver involvement in schooling was assessed in the fall of the kindergarten year via a 9-item, teacher-report scale measuring caregiver involvement in preparing children for school, the frequency of caregiver communication with the teacher, and caregiver interest in solving problems at school. The scale showed good internal consistency ( $\alpha = .89$ ).

## Covariates

**General Cognitive Functioning**—At the baseline assessment, the children completed the Vocabulary and Block Design subtests of the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R; Wechsler, 1989). These subtests are considered to be the strongest measures of verbal and performance intelligence, respectively, and are highly correlated with other general intelligence measures (Wechsler, 1989). The scaled scores for these subtests were averaged. In the general population, the mean of WPPSI-R scaled scores is 10 with a standard deviation of 3.

**Age at Baseline Assessment**—Because inhibitory control is associated with age (Kochanska, Murray, & Harlan, 2000), we controlled for age at the baseline assessment in all analyses. Additionally, as is noted above, the time between the baseline assessment and the first school assessment varied. However, child age at the baseline assessment was strongly correlated with time between the baseline and school assessments ( $r = -.81, p < .$



001). Rather than adding another control variable, we used child age at the baseline assessment to control for time between the baseline and school assessments.

**School Characteristics**—Indices of school characteristics were retrieved from the Oregon State Department of Education’s website (e.g., number of children receiving free or reduced lunches, average class size, and percentage of teachers with a master’s degrees or higher; Oregon Department of Education, 2007). These indices were averaged across kindergarten and first grade. These data were not available at either kindergarten or first grade for 7 children: 3 children in private schools (1 FC and 2 CC), 3 FC children in specialized schools, and 1 CC child living out-of-state. Additionally, each child’s school was classified as a regular public school, a private/magnet school, or a specialized treatment school. In a few cases, a child attended a regular school for 1 year and a private/magnet school the other year; in such instances, the child was coded as attending a private/magnet school. No children had been in a private/magnet or regular school and a specialized treatment school.

### Data Analysis Plan

Preliminary analyses were conducted to examine patterns of normality and missing data. Next, differences between the FC and CC groups on the hypothesized mediators, covariates, and outcomes were examined using Hotelling’s  $T^2$  tests to control for inflated error rates. This was followed by tests of the associations between the hypothesized mediators, covariates, and outcomes using bivariate correlations. Finally, the full path model with the hypothesized mediators, covariates, and outcomes was tested using Mplus (v. 5.1; Muthén & Muthén, 2007).

## Results

### Preliminary Analyses

Prior to the analyses, all of the variables were examined for significant deviations from normality and outliers. The caregiver involvement variable was significantly skewed and was log transformed. Additionally, for the academic and social competence variables, there was one extreme outlier for each ( $\pm 3 SD$  of the mean). These scores were recoded to the next value that was within 3 standard deviations of the sample mean. In general, for the composite scores and other variables, there was little missing data (< 6%), with the exception of caregiver involvement. Because caregiver involvement in the fall of the kindergarten year was used, missed assessments at this time point resulted in data missing for 17% of the sample on this variable. In the path analyses using Mplus, missing data were estimated using full information maximum likelihood techniques. To account for the nonindependence of the sibling groups, the Hotelling’s  $T^2$  tests and bivariate associations were repeated with randomly selected siblings omitted. There were no significant changes in the patterns of results. Additionally, the cluster design approach in Mplus, which adjusts standard errors for the nonindependence of data, was used for the path analyses. Thus, to maximize power, all of the siblings were retained in the analyses. Finally, to determine if there were gender differences on the hypothesized mediators, covariates, and outcomes, gender was entered into the Hotelling’s  $T^2$  tests. The overall  $T^2$  values were not significant. Thus, gender was not included as a covariate.

### Group Differences

To control for the possibility of inflated errors with multiple single  $t$ -tests, two Hotelling’s  $T^2$  tests were used to examine group differences. The hypothesized mediators, covariates, and outcomes were tested in two groups: one included the child and family characteristics (mediators, general cognitive ability, and school adjustment) and the other included the

school characteristics variables. The overall  $T^2$  statistic (adjusted for unequal covariances) for the child and family characteristics indicated that there were significant group differences,  $T^2(5, 103) = 33.51, p < .01$ . As is shown in Table 2, follow-up individual  $t$ -tests indicated that the groups differed on all of the variables. (Negative values on composite scores indicate that the scores were below the sample mean.)

For the school characteristics, there was a significant overall  $T^2$  statistic (adjusted for unequal covariances),  $T^2(3, 106) = 12.36, p < .01$ . Examination of the individual  $t$ -tests revealed that there was a significant group difference in the percentage of teaching staff with a master's level degree or higher (Table 2).

Finally, a chi-square test was used to determine if there were group differences in the likelihood of attending private/magnet schools. In the current study, 25% of the CC children attended a private/magnet school compared to 6% of the FC children,  $\chi^2(1) = 10.58, p < .01$ . (The group difference remained even when the 5 FC children in treatment schools were excluded from analyses.)

### Correlational Analyses

The bivariate correlations among the variables are displayed in Table 3. Consistent with the group differences, a history of maltreatment and foster placement was associated with lower academic and social-emotional competence in kindergarten and first grade. It was hypothesized that inhibitory control in preschool and caregiver involvement in kindergarten would mediate the associations between a history of maltreatment and foster placement and school adjustment in kindergarten and first grade. To meet the criteria for mediation, the hypothesized mediators needed to be significantly associated with the predictor and outcome variables (Baron & Kenny, 1986). This proved to be the case for inhibitory control, which was significantly negatively associated with a history of maltreatment and foster placement and significantly positively associated with the school adjustment measures. Also in accordance with predictions, caregiver involvement in school was significantly negatively associated with a history of maltreatment and foster placement and significantly positively associated with academic and social-emotional competence.

The associations among the covariates and the other measures were also examined. As is detailed above, there were moderate correlations between some school characteristic variables and a history of maltreatment and foster placement; however, these variables were not significantly associated with the mediators or the outcomes. Thus, these variables were not used as covariates in the path analyses described below. General cognitive ability was strongly associated with academic competence and less strongly (but significantly) associated with social-emotional competence. Additionally, general cognitive ability and age at the baseline assessment were significantly positively associated with inhibitory control.

### Path Analysis

Mplus was used to conduct the path analyses to determine whether the patterns of associations between a history of maltreatment and foster placement and the hypothesized mediators and outcomes remained significant when age and general cognitive ability were controlled. Additionally, the significance of mediated paths was tested. The results of the path analysis, trimmed to show only paths with a probability level of .10 or less, are shown in Figure 1. (The patterns of significance did not differ from those in the full, nontrimmed model, which was not a significantly better fit than the model presented here.) The trimmed model showed a good fit,  $\chi^2 = 8.84, p = 0.36, CFI = 0.99, TLI = .99, RMSEA = .000, SRMR = 0.05$ . As was hypothesized, although a history of maltreatment and foster placement was significantly related to academic and social-emotional competence in the bivariate

correlations, it was not in the full model. Direct paths between a history of maltreatment and foster placement and the school adjustment variables did not reach significance. Instead, as was predicted, the effects of a history of maltreatment and foster placement on academic and social-emotional competence were fully mediated through inhibitory control. The indirect path from a history of maltreatment and foster placement to academic competence through inhibitory control was significant ( $t = -2.08$ ), as was the indirect path from a history of maltreatment and foster placement to social-emotional competence through inhibitory control ( $t = -2.74$ ).

Additionally, there was a significant indirect path from a history of maltreatment and foster placement to social-emotional competence through caregiver involvement ( $t = -2.10$ ). This finding supports the hypothesis that the effects of a history of maltreatment and foster placement on social-emotional competence are mediated through caregiver involvement. There was also a significant association between caregiver involvement and academic competence, although the indirect path from a history of maltreatment and foster placement to academic competence through caregiver involvement was not significant.

In the model, general cognitive ability was no longer directly associated with social-emotional competence. Instead, there was a significant indirect path from general cognitive ability to social-emotional competence through inhibitory control ( $t = 2.38$ ), indicating full mediation. Age at the baseline assessment was significantly negatively associated with academic competence, suggesting that children who entered the study at younger ages demonstrated better academic competence.

To examine whether there were different patterns of associations within the FC and CC groups, a multiple groups model was run. The patterns of associations were similar across the two groups with two exceptions: general cognitive ability was not associated with inhibitory control in the CC group, and age at the baseline assessment was not associated with academic competence in the CC group. Also, because the FC and CC groups differed significantly on general cognitive ability (with a 1.78 point mean difference equal to .60 of a standard deviation or about 9 IQ points), additional analyses were undertaken to determine if the group differences in school adjustment might be attributable to differences in general cognitive ability. Although the group means differed significantly, there was also considerable overlap between the two groups, allowing for exact matching of 40 FC children with 40 CC children on general cognitive ability scores. The path model described above was then rerun with only those 80 children. Although significance was in some cases reduced due to the smaller sample size, the patterns of associations were the same as those found in the path analysis that included the whole sample with general cognitive ability as a covariate.

## Discussion

Maltreated children in foster care are at high risk for difficulties in school adjustment (Blome, 1997; Courtney & Dworky, 2006; Geenen & Powers, 2006; Goerge et al., 1992; Smithgall et al., 2004). The current study demonstrates that these difficulties are apparent as early as school entry. Compared to their nonmaltreated peers, maltreated foster children showed lower academic and social-emotional competence in kindergarten and first grade. This finding was not surprising given that preschool-aged foster children show deficits in a number of domains such as language, psychosocial functioning, and neuropsychological functioning (Klee, Kronstadt, & Zlotnick, 1997; Pears & Fisher, 2005; Stahmer et al., 2005). However, this is the first study to focus on the functioning of maltreated foster children at school entry. The finding that maltreated foster children demonstrate deficits in the early school years underscores the significance of screening preschool-aged foster children for

developmental delays. Additionally, the results from this study suggest that, in the absence of prior screening, foster children might need to be screened upon school entry for academic and social-emotional difficulties to enable timely intervention.

Preschool levels of inhibitory control were positively associated with academic and social-emotional competence in kindergarten and first grade. This finding provides further support for the hypothesis that inhibitory control abilities are important components of school readiness (McClelland et al., 2006) and is consistent with other studies linking inhibitory control with greater school readiness skills (e.g., Blair & Razza, 2007). As is noted above, children who show greater inhibitory control are able to regulate prepotent behavioral and attentional responses. Thus, they are more likely to focus on academic activities. They are also more likely to control their behavioral responses to peers and to show more prosocial behavior.

Inhibitory control was negatively associated with a history of maltreatment and foster placement, suggesting that these experiences have deleterious effects on this ability. This is consistent with other studies showing that early parenting and family environment shape the development of inhibitory control in the toddler and preschool years (Kochanska et al., 2000; Valiente et al., 2007). Specifically, this association supports findings from other populations of children who have experienced early adversity. As is noted above, other studies have demonstrated negative effects of maltreatment and multiple foster placements on inhibitory control (Beers & DeBellis, 2002; Lewis et al., 2007). Researchers working with postinstitutionalized adoptees who experienced severe deprivation have shown that these children also display deficits in attentional processes in general (Kreppner, O'Connor, Rutter, & the English and Romanian Adoptees Study Team, 2001) and in inhibitory control specifically (Bruce, Tarullo, & Gunnar, 2009). Thus, this finding is consistent with previous results suggesting that early adversity has significant neurobiological consequences. By and large, these studies have not yet disentangled the effects of maltreatment and multiple caregiver disruptions. This remains an important topic for future research.

These neurobiological effects of early adversity might impact longer-term outcomes given that the effects of a history of maltreatment and foster placement on school adjustment a number of years later were fully mediated by preschool inhibitory control. Although these results illustrate the potential long-term developmental consequences of maltreatment and foster placement, they also suggest a potentially powerful avenue for preventive intervention. Helping maltreated foster children to improve their inhibitory control skills prior to kindergarten might help to prevent academic and social difficulties and, in turn, place the children on a track of increasing school success. A recent school-based preventive intervention program aimed at reducing behavioral problems and promoting social-emotional competence was shown to improve inhibitory control abilities in elementary-school children (Riggs, Blair, & Greenberg, 2003), suggesting that inhibitory control abilities are amenable to intervention efforts.

The results from this study also support the importance of increasing caregiver involvement in schooling as a means of promoting maltreated foster children's positive school adjustment. As with inhibitory control, caregiver involvement fully mediated the effects of a history of maltreatment and foster placement on social-emotional competence. Foster caregivers were less involved in children's schooling than were the biological parents of the nonmaltreated children. As is noted above, this disparity might be due to a number of factors including the foster caregiver's lack of information about the child's school history and the relatively short duration of foster care placements. Additionally, foster caregivers might not be aware of the processes that govern access to special services and may be unsure about whether they can authorize the children's participation in them (Choice et al., 2001). Thus,

foster caregivers might benefit from additional education about the needs of foster children and ways to make contact with school personnel and to obtain services for the children.

Inhibitory control and caregiver involvement are not likely to be the only mediators in the association between a history of maltreatment and foster placement and school outcomes. Other factors such as developmental status, language abilities, and early literacy skills, to name a few, are likely to impact foster children's success in early elementary school. However, the findings of the current study suggest that interventions that include foci on inhibitory control skills and caregiver involvement in schooling, along with other emphases on early literacy skills to increase academic competence and social-emotional skills to enhance social competence, might be particularly effective in improving maltreated foster children's early school adjustment. Head Start, one of the most widely recognized school readiness interventions, is focused on children's early literacy and social-emotional skills and caregiver involvement in school (Zigler & Styfco, 1995). This groundbreaking program has been found to increase literacy and social skills in low-income children (Abbott-Shim, Lambert, & McCarty, 2003; U.S. Department of Health and Human Services, 2001). More recently, several promising programs with foci on social-emotional skills and behavior regulation have shown positive impacts on children's social skills and behaviors (Domitrovich, Cortes, & Greenberg, 2007; Webster-Stratton, Reid, & Stoolmiller, 2008). Although these programs have demonstrated efficacy with general populations of children, none has been tested specifically with maltreated foster children, and none offers all of the components that seem to be important for these children. For example, although Head Start is focused on early literacy skills, social-emotional skills, and caregiver involvement, it lacks a focus on improving inhibitory control. Conversely, programs aimed at increasing behavior regulation are not focused on caregiver involvement. Thus, perhaps programs that emphasize inhibitory control and caregiver involvement as well as early literacy skills and social-emotional skills will be more efficacious in improving the school readiness of maltreated foster children (Pears, Fisher, & Bronz, 2007; Pears, Fisher, Heywood, & Bronz, 2007).

In the current study, it was surprising that school characteristics did not appear to be related to outcomes in correlational analyses. Other studies have found such factors to be associated with school adjustment (Konstantopoulos, 2006). The maltreated foster children and their nonmaltreated peers were matched on SES, and the schools in the metropolitan area in which this study was conducted were all relatively well ranked. Thus, the schools might have been too homogeneous to detect the effects of school characteristics on outcomes. Future research should explore how school quality might help maltreated foster children to compensate for deficits in academic and social-emotional skills.

This study identified two important mediators between a history of maltreatment and foster placement and early school adjustment. However, a few limitations and directions for future research should be noted. First, although the sample included a relatively large number of maltreated foster children and the effects of the mediators were moderate, the sample size might have limited the power to detect weaker associations among variables. The smaller sample size also precluded examining the effects of specific dimensions of the maltreated foster children's maltreatment and foster care experiences (e.g., type of maltreatment and number of caregiver transitions) on the mediators and school outcomes. As is noted above, maltreated foster children are unique because they have been maltreated and placed into foster care. Thus, future work should focus on disentangling the effects of specific maltreatment and foster care experiences. Additionally, as is noted above, although inhibitory control and caregiver involvement appear to be important mediators of the association between a history of maltreatment and foster placement and later school adjustment, they are not likely to be the only ones. Future research should focus on

identifying additional mediators that would provide further targets for preventive interventions. Finally, there were no gender differences in outcomes or mediators in the current sample. Using a subsample of the children in the current study, Leve, Fisher, and DeGarmo (2007) found that gender moderated the association between foster care status and peer relations in the early grades. However, that study focused exclusively on measures of peer relations rather than on broader measures of social-emotional competence.

The current study demonstrated that maltreated foster children are markedly behind their peers in academic and social-emotional competence as early as kindergarten and first grade. In the absence of intervention, these deficits are likely to lead to maladaptive trajectories of academic achievement across the school years. There is cause for hope, however, in the identification of two possible targets for preventive intervention: inhibitory control and caregiver involvement. Interventions that target inhibitory control and caregiver involvement as well as early literacy and social-emotional skills might place the maltreated foster children on increasingly positive trajectories of academic and social success.

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**Figure 1.** Path analysis of the associations between a history of maltreatment and foster placement, hypothesized mediators, covariates, and school adjustment. \* $p < .05$ .

**Table 1**Reliability Statistics for Subscales of the School Adjustment Measures<sup>a</sup>

	Kindergarten fall	Kindergarten spring	First grade spring
Language and learning skills	.87	.90	.84
Prosocial behavior	.90	.89	.91
Emotion regulation ( <i>r</i> values)	.41	.48	.60
Behavior regulation	.82	.78	.79

<sup>a</sup> All values represent standardized alpha coefficients unless otherwise noted.

**Table 2**  
Means and Standard Deviations by Groups for the Hypothesized Mediators, Covariates, and Outcomes

	Foster care group		Community comparison group		<i>T</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
School outcome measures					
Academic competence	-0.16	0.92	0.30	0.67	2.93**
Social-emotional competence	-0.21	0.70	0.25	0.73	3.42**
Hypothesized mediators					
Inhibitory control	-0.11	0.69	0.28	0.53	3.28**
Caregiver involvement	-0.20	0.15	-0.14	0.12	2.50**
Covariates					
Percentage of students receiving free or reduced lunch	52.51	16.89	46.60	17.05	1.96 <sup>+</sup>
Average class size	23.31	2.28	23.33	1.53	0.07
Percentage of teachers with a master's degree or higher	45.87	13.10	52.94	13.99	2.96**
General cognitive ability	8.02	2.14	9.80	2.06	4.42**
Age at the baseline assessment	4.54	0.82	4.33	0.79	1.51

*Note.* Negative values on composite scores indicate that the scores were below the sample mean.

<sup>+</sup>  $p < .10$ .

\*\*  $p < .01$ .

Table 3

Correlations Among Hypothesized Mediators, Covariates, and Outcomes

	1	2	3	4	5	6	7	8	9	10
1. Maltreatment and foster care	—									
2. Academic competence	-.29**	—								
3. Social-emotional competence	-.29**	.33**	—							
4. Inhibitory control	-.34**	.35**	.33**	—						
5. Caregiver involvement	-.24**	.30**	.37**	.21*	—					
6. Percentage of students receiving free or reduced lunch	.17+	-.08	.07	-.12	-.06	—				
7. Average class size	.01	-.09	-.04	.06	-.17+	-.30**	—			
8. Percentage of teachers with a master's degree or higher	-.25**	.10	.05	-.01	-.06	-.04	.16+	—		
9. Child in private/magnet school	-.30**	.17+	-.05	.04	-.01	-.29**	-.01	.05	—	
10. General cognitive ability	-.37**	.50**	.17*	.39**	.12	-.18*	-.02	.20*	.11	—
11. Age at the baseline assessment	.13	-.06	.05	.38**	.14	-.07	.05	-.11	-.06	.04

+  $p < .10$ .\*  $p < .05$ .\*\*  $p < .01$ .