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Adult Resilience among Maltreated Children: A Prospective Investigation of Main Effect and Mediating Models

James Topitzes¹, Joshua P. Mersky², Kristin A. Dezen³, and Arthur J. Reynolds⁴

¹University of Wisconsin-Milwaukee, Helen Bader School of Social Welfare

²University of Illinois-Chicago, Jane Addams College of Social Work

³University of Wisconsin-Milwaukee, School of Education

⁴University of Minnesota-Twin Cities, Institute of Child Development

1. Introduction

Over the past several decades, scholars have investigated resilience among the victims of child maltreatment (Cicchetti, 2004). Results suggest that only a minority of maltreatment survivors demonstrate adaptive functioning. Furthermore, most of these individuals realize resilience at one point in time within one or several adjustment domains (Egeland, 1997), while only a select few manifests positive adjustment persistently across diverse spheres of development (Bolger & Patterson, 2003).

Challenges in conducting this research abound, including the task of defining and measuring resilience. Due to practical constraints, researchers often assess resilience with only one or several outcomes (e.g., Grogan-Kaylor, Ruffolo, Ortega, & Clarke, 2008). Given its multidimensional nature however, resilience is best measured across a range of outcomes (see Walsh, Dawson, & Mattingly, 2010). A comprehensive measurement approach also accounts for multifinality, the phenomenon whereby maltreatment probabilistically predicts a number of distinct untoward outcomes (Cicchetti & Rogosch, 1997).

Just as resilience can differ across developmental and functional domains, it can also change over time. Resilient outcomes result from dynamic transactions between developmental systems and environmental supports (Masten, 2007). For example, individuals exhibiting non-resilient functioning in childhood can achieve adaptive levels of functioning in adolescence through corrective inputs from, for instance, prevention and intervention programming in schools (Wolfe, Crooks, Chodo, & Jaffe, 2009). Although longitudinal assessment of adjustment is both time-consuming and resource-intensive, long-term studies extending beyond childhood and adolescence represent optimal means of tracking resilience (Werner, 2005).

Moreover, measuring outcomes of maltreatment longitudinally into adulthood facilitates analysis of temporally-ordered adolescent processes that mediate the link between childhood

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Correspondence concerning this article should be addressed to: James Topitzes, University of Wisconsin-Milwaukee, Enderis 1057, P.O. Box 786, Milwaukee, WI 53201. topitzes@uwm.edu.

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maltreatment and adult functioning. Understanding these mechanisms can help reveal pathways that distinguish maladaptation versus adaptation among maltreatment victims and potentially can inform key strategies that foster positive development in the face of significant adversity (Bolger & Patterson, 2003). Alink, Cicchetti, Kim, and Rogosch (2009) suggest that the use of longitudinal data to investigate pathways from maltreatment to developmental outcomes represents a new frontier in maltreatment research that addresses the question of *how* maltreatment influences development.

1.1 Contributions of the Current Study

We prospectively investigated an association between childhood maltreatment, ages 0–11, and young adult resilience, ages 16–24. A number of domains contribute to our criterion measure, enhancing its scope and validity. Two research questions guide analyses:

1. Does childhood maltreatment significantly predict young adult resilience?
2. What theory-informed adolescent mediating pathways help to explain the significant association between childhood maltreatment and young adult resilience?

Data on over 1,100 subjects originated from the Chicago Longitudinal Study (CLS), a prospective investigation of economically disadvantaged, predominantly African-American participants. Our indicator of maltreatment emerged from official juvenile court and child protective service records. Prospectively administered child, parent, and teacher surveys along with administrative records produced covariate and mediator measures. Multiple sources, including self-reports, contributed to our resilience outcome measure.

The current study represents a follow-up to a previous paper (Mersky & Topitzes, 2010). In our earlier work, we assessed longitudinal relations between child maltreatment, ages 0–17, and 1) a number of discrete young adult outcomes and 2) a composite measure of young adult resilience. We presently limit our explanatory variable to ages 0–11 to test a main effect relation between childhood maltreatment and the composite resilience measure while controlling for maltreatment ages 12–17. We also extend analyses to test mediating pathways.

Building on our past work, this current study offers several contributions. First, whereas most resilience-to-maltreatment studies measure outcomes proximal to maltreatment (e.g., Haskett, Nears, Ward, & McPherson, 2006), this study analyzes prospective, longitudinal data to assess resilience years after maltreatment has occurred. Second, as we did in our previous study, we operationalize resilience as adaptive functioning across multiple domains, a hallmark of contemporary developmental research (see, Luthar & Brown, 2007; Masten, 2007; Rutter, 2007). Moreover, constructing the outcome from several sources helps us overcome the same-source bias that hampers other similar studies (e.g., Pepin & Banyard, 2006). Third, few longitudinal studies have assessed mediating processes linking childhood maltreatment to functioning in young adulthood let alone young adult resilience. Furthermore, early mediation studies within the resilience framework may have temporally blended and conceptually conflated mediators with outcomes (Kinard, 1998). However, our hypothesized mediators represent typical adolescent adjustment domains measured from ages 12–17. These measures are distinct from although related to young adult markers of resilience.

Finally, our study sample consists primarily of low-income, urban-dwelling, African American participants. This study feature isolates the relations of interest within a homogeneous group at risk for both childhood maltreatment and poor young adult outcomes (Sedlak & Broadhurst, 1996). While generalizability of results is limited, findings can

inform interventions designed for this high risk subgroup, a chief aim of resilience research (Luthar & Brown, 2007).

2. Review of Literature

2.1 Question 1

A number of studies have examined the link between child maltreatment and later indicators of resilience. Although most maltreatment-resilience studies assess the outcome of interest in childhood or adolescence, a small percentage measure resilience within adulthood. The majority of these investigations have relied on cross-sectional, retrospective self-report data. Results support the contention that child maltreatment, variously defined, is negatively associated with a number of unfavorable adult outcomes including overall adult resilience.

To illustrate, Collishaw et al. (2007), utilizing data from the Isle of Wight study (N=364), found that retrospectively self-reported child abuse (physical and sexual) was significantly related to an increased likelihood of self-reported problems in adulthood including mental disorders, criminality, and health impairments. Relying on a larger sample from the Ontario Health Survey (N=6,681), Williams, MacMillan, and Jamieson (2006) uncovered a significant and inverse relation between retrospectively self-reported child abuse (physical and sexual) and adult adjustment, defined as low rates of externalizing and internalizing psychiatric disorders.

Significant associations between child maltreatment and adult functioning have also been demonstrated in university samples. For instance, in Pepin and Banyard's (2006) study of just over 200 undergraduate students, a measure of retrospectively self-reported child abuse and neglect significantly predicted trust, intimacy, and full-scale adjustment in adulthood. Additional investigations into the linkage between child sexual abuse and adult resilience among females have been conducted; however, these studies often lack non-maltreatment control groups given the aim of comparing the resilient versus non-resilient life course development of female abuse survivors (e.g., Hyman & Williams, 2001).

Studies from Widom and colleagues (McGloin & Widom, 2001) and the CLS (Mersky & Topitzes, 2010) have addressed common limitations of the above-cited literature. Both groups utilized prospective measurement designs, comprehensive measures of maltreatment and resilience, multiple measurement sources and large sample sizes (i.e., over 1,100 participants). McGloin and Widom (2001) compared the trajectories of 676 individuals with confirmed childhood abuse and neglect court records to those of 520 matched controls. The authors created an adult resilience measure from the following data: employment, housing, education, social activity, mental health, behavioral health, official arrest and self-report violence. Adaptive functioning in 6 or more domains qualified as resilient functioning. Within this framework, 22% of the maltreatment group, all of whom experienced childhood maltreatment from the ages of 0–11, achieved resilience versus 41% of the non-maltreatment group ($p < .001$).

Because Mersky and Topitzes (2010) used a sample that was not selected on maltreatment, only 13.5% of participants experienced verified maltreatment from the ages of 0–17. This figure, versus 56.5% of the Widom sample, more closely resembles maltreatment prevalence rates from epidemiological studies (see Aos, Lieb, Mayfield, Miller, & Pennucci, 2004). The CLS sample is therefore more representative of community settings, particularly disadvantaged areas, although less statistically powered to detect maltreatment effects. To create the adult resilience outcome, Mersky and Topitzes (2010) summed dichotomous measures from the following domains: educational attainment, employment, criminality, behavioral health, and mental health. A positive score of 5 or above on the resulting index

(several domains included two measures yielding a total possible score of 7) earned a designation of resilience. Under this criterion, 15.7% of the maltreatment group realized resilience compared to 38.2% of controls.

2.2 Question 2

An integrative theory explaining child maltreatment effects, the ecological-transactional model of maltreatment (Cicchetti & Lynch, 1993) guides the construction of our mediator model. Cicchetti and Lynch's framework identifies ecological influences and individual capacities that are crucial for successful adaptation yet vulnerable to maltreatment, including family support, cognitive development, socio-emotional development, moral development, motivational development, and school adjustment (Cicchetti & Valentino, 2006). Research conducted from this orientation has produced evidence to support postulated maltreatment impacts (e.g., Kim & Cicchetti, 2006); hence, we tested adolescent measures from each developmentally-salient domain as potential study mediators. Below, we highlight the empirical evidence for doing so.

2.2.1 Family support—Found to exert significant influence on post-maltreatment trajectories, the latent construct of family support has been operationally defined in several distinct ways: parental attachment, maternal warmth, parental expectations, and family stability. For instance, using data from the Lehigh Longitudinal Study, Sousa and colleagues (2011) found that several forms of maltreatment weakened parent-child attachments. Nonetheless, some adolescents who experienced earlier maltreatment reported relatively high levels of attachment to parents, which in turn helped them avoid antisocial behavior. Earlier analyses from the Lehigh Longitudinal Study also revealed that maternal warmth and high parental expectations conferred protective effects among maltreated children (Herrenkohl, Herrenkohl, & Egolf, 1994).

Regarding family or placement stability, out-of-home placement along with multiple foster care placements has been shown to increase the likelihood of delinquent offending among children who experienced official child maltreatment (Ryan & Testa, 2005). While instability can exacerbate deleterious impacts of child maltreatment, family or residential stability can help to reduce post-maltreatment impairments. As an example, DuMont and colleagues (2007) revealed that children who had been maltreated were more likely to adjust positively in adolescence if they experienced stable living conditions (i.e. few residential moves) as children.

2.2.2 Cognitive development—Empirical evidence indicates that cognitive measures can help mediate linkages between maltreatment and resilience or non-resilience (e.g., Flores, Cicchetti, & Rogosch, 2005; Hasket et al., 2006). It appears, for instance, that abuse or neglect in childhood impairs cognitive functioning in adolescence (Mills et al., 2011). Moreover, poor cognitive performance among maltreatment victims can disrupt development via influences on school adjustment, antisocial behavior, and mental health (Topitzes, Mersky, & Reynolds, 2010).

Adequate cognitive functioning among maltreatment victims can conversely contribute to positive developmental outcomes, according to limited evidence. DuMont and colleagues (2007) showed that cognitive development, measured as language or reading ability, significantly predicted later resilience among survivors of maltreatment, but only for those who grew up in advantaged neighborhoods. Results from Jaffee, Caspi, Moffitt, Polo-Tomasc, and Taylor (2007) support the notion that cognitive abilities, within the maltreatment risk context, must interact with contextual forces in order to actualize protective effects.

2.2.3 Socio-emotional development—Relative to cognitive development, emotional and social adjustment appear to fulfill a more definitive role in potentiating or mitigating maltreatment effects. For example, processes related to emotion regulation appear to discriminate between resilient and non-resilient maltreatment survivors. Kim and Cicchetti (2010) found that multiple types of maltreatment increased risk for emotion dysregulation, which initiated a cascade of negative developmental effects. Conversely, maltreatment victims who exercise some form of emotion regulation are more likely to achieve positive outcomes. An oft-cited study from Cicchetti and Rogosch (1997) concluded that children who had been maltreated relied on ego-overcontrol (defined as the ability to inhibit impulses) to achieve competence within behavioral, mental health, and scholastic domains. In a similar study of disadvantaged Latino children (Flores et al., 2005), ego-overcontrol did not predict resilience among maltreated children; instead, a moderate level of ego-control augured well both for maltreated and nonmaltreated children. Bolger and Patterson (2001) found that internal perceived control predicted positive performance among maltreated children on a composite resilience measure.

Regarding social adjustment, mixed and specific types of child maltreatment appear to negatively influence social outcomes which in turn can result in subsequent maladjustment. For instance, children who have experienced maltreatment have been rated by peers as less likable than their non-maltreated counterparts due to increased aggression or social withdrawal (Anthonysamy & Zimmer-Gembeck, 2007). Similarly, Bolger and Patterson (2001) found that chronically maltreated children were likely to be rejected by peers due to their aggressive tendencies. In turn, poor social skills and problematic peer affiliations among maltreated children can predict poor adolescent outcomes (e.g., Perkins & Jones, 2004).

While maltreatment predicts poor social outcomes, prosocial behavioral tendencies or positive social supports can help maltreatment victims realize adaptive outcomes. Bolger and Patterson (2001) reported that maltreated children with at least one reciprocal friendship scored significantly better on a composite assessment of resilience versus maltreated children reporting no reciprocal friendships. For adolescents who experienced maltreatment earlier in life, positive peer affiliations appear to contribute significantly to resilient outcomes as well (see Collishaw et al., 2007; Edmond, Auslander, Elze, & Bowland, 2006; Perkins & Jones, 2004). Furthermore, indicators of social support received from friends have also been shown to confer protective effects for individuals maltreated in childhood (Kaufman et al., 2004; Pepin & Banyard, 2006).

In sum, it appears that different indicators of emotion regulation and social adjustment or support represent potential risk or protective mechanisms for maltreated children. All studies cited above, however, rely on cross-sectional designs or follow samples through adolescence. Longitudinal studies of adaptation among maltreated children that extend into adulthood will help determine if and how socio-emotional forces extend their influence beyond adolescence.

2.2.4 Moral development—Cicchetti and Valentino (2006) asserted that the parental discipline strategies associated with maltreatment undermine children's moral development. Several studies from Cicchetti's group have supported the idea that maltreatment hinders acquisition of moral reasoning skills (e.g., Koenig, Cicchetti, & Rogosch, 2004). Moreover, it appears that impaired moral development can result in problems such as delinquency. For instance, Stuewig and McCloskey (2005) revealed that maltreatment significantly affected the formation of moral emotions, i.e., guilt and shame, which in turn increased the likelihood of delinquent behavior. Others have also identified impairments in moral emotions, reasoning, or judgment as significant predictors of delinquency (e.g., Tarry & Emler, 2007).

In this investigation, we treat juvenile delinquency as a proxy for moral development. Delinquency is a heterogeneous construct, but evidence cited above suggests it represents, in part, a failure to master age-salient tasks associated with moral reasoning. Delinquency is also a well-established consequence of child maltreatment (e.g., Mersky & Reynolds, 2007) and has been shown to mediate between childhood maltreatment and later outcomes (Degue & Widom, 2009; Topitzes et al., 2010). As such, it constitutes a plausible mediator for our model.

2.2.5 Motivational development—Child maltreatment has been shown to alter measures of motivational development such as future orientation, perceived self-competence and achievement motivation (e.g., Chan & Yeung, 2009). Deficits in neurobiological functions may reflect and exacerbate these decrements in motivation (Beauchaine, Neuhaus, Zalewski, Crowell, & Potapova, 2011). Consequently, performance in domains such as school adjustment may suffer (Sapientza & Masten, 2011).

Conversely, a minority of maltreatment survivors might enlist motivational processes to overcome the deleterious, long-term effects of child maltreatment, as suggested by several of the studies cited above. Perkins and Jones (2004), for instance, found that having positive vocational expectations reduced the likelihood that adolescents maltreated as children would engage in risky behaviors. Edmond et al. (2006) revealed that future orientation and scholastic achievement motivation helped female adolescent survivors of sexual abuse realize resilience.

2.2.6 School adjustment—Child maltreatment increases the likelihood of various adverse school outcomes including poor academic achievement and absenteeism (Cicchetti & Rogosch, 1997; Widom, 2000). Therefore, many scholars surmise that adequate school performance can promote resilience to maltreatment (see Iwaniec, Larkin, & Higgins, 2006). In a cross-sectional study, completing high school, even when academic achievement remains low, was empirically shown to enhance resilience among individuals maltreated as children (Williams et al., 2006). We are unaware of longitudinal studies that examine the mediating effects of adolescent school adjustment on the childhood maltreatment-adult resilience relation.

3. Methods

3.1 Sample and Data

The CLS is a panel study tracking the development of 1,539 economically disadvantaged minority individuals born in 1979 or 1980. The sample includes children who enrolled in the Chicago Child-Parent Center (CPC) preschool and kindergarten programs through 1986 (n=989) along with children who did not attend a CPC program but did complete a public kindergarten program in 1986 (n=550). The CPC is a center-based program that provides educational and family-support services to children residing in high-poverty neighborhoods. In this current study, we examine the effects of childhood maltreatment while controlling CPC program participation.

Maltreatment and non-maltreatment groups were identified by reviewing official maltreatment records once study participants reached 18 years of age. The presence or absence of documented maltreatment histories was verified for 1,411 of the original 1,539 CLS participants via triangulation of child protective service records, juvenile court records and other administrative sources indicating that subjects resided in Chicago after age 10 (Reynolds & Robertson, 2003). For 83.8% of the 1,411 sample (N=1,182), outcome data from ages 16–24 were collected from self-report and administrative records to ascertain young adult status.

Table 1 presents descriptive statistics for study measures along with comparisons of the study and attrition samples on select variables. There were no significant group differences in overall risk status or maltreatment rates from ages 0–11. However, results indicated that compared to the study sample the attrition sample has a significantly lower proportion of females, African-Americans, and CPC school-age participants. We addressed the possibility of attrition bias methodologically in two ways. First, we statistically controlled for all covariate measures in multivariate analyses. Second, we employed a propensity scoring procedure to construct a variable predicting sample members' conditional probability for study inclusion and entered this measure into secondary regression models to test for differential attrition effects.

3.2 Procedure

Relying on a number of diverse sources, the CLS has collected comprehensive participant data from birth through age 24. During initial stages of the project, the CLS gathered information from participants' parents, public schools, and a number of state-level departments. Official school records, teacher surveys, juvenile court records, and student self-reports indicated participants' progress throughout middle and high school years. In an adult wave of assessments, the CLS administered a face-to-face, self-report interview from 2002–2004 when participants were 22–24 years old. Several measures created from this adult survey contributed to the current resilience outcome. Additional information on participants' adult resilient functioning originated with a number of administrative offices, e.g., the Illinois Department of Employment and Security and a network of Chicago-area postsecondary schools. Records stored within these data sources were verified through social security number and birth date matching procedures.

3.3 Outcome Measures

3.3.1 Resilience—We constructed a summative index of the seven outcomes described below. We reverse-coded measures representing maladjustment (e.g., incarceration) such that a code of 1 indicated competence, then summed the seven outcomes. Subsequently, we dichotomized the index to indicate whether participants reached a threshold reflective of resilient functioning: *5 or more positive outcomes* (5/7 resilience outcome). We chose 5 or more as the cutoff point to reflect previous research (e.g., McGloin & Widom, 2001). We also devised a more stringent resilience measure identifying cases with *6 or more positive outcomes* (6/7 resilience outcome). For each individual outcome, and for our primary resilience outcome, we relied on a definition of resilience that suggests one is “doing OK” considering risk faced (Masten, Cutuli, Herbers, & Reed, 2009).

To determine the number of cases meeting resilient and non-resilient criteria for both measures, we counted both the number of positive or 1 values assigned to each case across the seven outcomes in question as well as the number of 0 values. We coded a number of cases as non-resilient that did not have valid data for all 7 outcomes but did have a minimum number of 0 values to meet the criterion for a non-resilient designation. Consequently, the valid cases for the 6/7 resilience outcome (N=1,296) exceeded that of the 5/7 resilience outcome (N=1,182).

3.3.2 Educational attainment—Educational attainment data were gathered from secondary and postsecondary schools, supplemented with self-reported adult survey responses. We relied on these data to construct two dichotomous measures: (1) *high school completion* and (2) *college attendance*. High school completion indicates whether participants earned a high school diploma or completed a General Educational Development (GED) degree by age 23. College attendance reveals whether participants earned at least one college credit at a college or university by age 23. We incorporated both measures into our

resilience outcome in order to acknowledge distinct levels of educational success. In addition, we included the college attendance measure in our resilience index to ensure that attending college translated into one point on the index given many college students would not earn a point as a result of their income.

3.3.3 Incarceration—Adult criminal histories were gleaned from county, state, and federal records and augmented with self-report data (N=1,418). The CLS received detailed reports of participants' adult crime involvement from Cook County and accessed publically available sources to search for crime data outside of Cook County jurisdiction. From these data, the CLS created a measure of *incarceration*, reflecting whether participants were sentenced to a state or federal correctional institution or to a county jail for at least 30 days.

3.3.4 Average income—Income data were collected for 1,334 participants from two sources: (1) records from the Illinois Department of Employment Security, and (2) self-reports from the adult survey. We created a dichotomous measure, *average income*, indicating if a participant averaged at least \$3,000 in quarterly income between January 1, 2002, and March 31, 2004. We used \$3,000 as a quarterly threshold because the average income in 2003 for African-Americans, age 18–24, was \$12,006 (U.S. Census Bureau 2004).

3.3.5 Behavioral and mental health—Adult survey data gathered from 1,142 participants (74.2% of original sample) informed three dichotomous measures of behavioral and mental health: (1) *substance abuse*, (2) *depressive symptoms*, and (3) *future expectations*. Participants were coded affirmatively for substance abuse if they endorsed at least one of the following two survey items: (a) any personal substance abuse problem from age 16 onward, and (b) any substance abuse treatment from age 18 onward. This measure correlated positively with a number of adverse adult CLS outcomes while demonstrating discriminant validity with favorable outcomes. Participants were coded positively for depressive symptoms if they acknowledged feeling one or more of the following almost every day or more within the past month: (a) depressed, (b) hopeless, (c) lonely, (d) very sad, or (e) life isn't worth living. Together the five items, taken from a modified version of the Derogatis Brief Symptom Inventory depression subscale (Derogatis, 1993), showed good internal consistency ($\alpha=0.84$) within the sample. This measure also demonstrated good properties of validity within the CLS dataset. Our stringent criteria for an affirmative code of depressive symptoms, i.e., endorsing a depression-related experience almost every day or more, reflected our liberal definition of resilience. A similar indicator of depressive symptoms has been used in the CLS previously (Reynolds & Ou, 2011).

We derived the measure of future expectations from Jessor's School Health Study (Jessor, Donovan, & Costa, 1989). Participants indicated their perceived chances of the following: graduating from college, having a job that pays well, having a job that they enjoy, having a happy family life, and being able to own a home. Response categories ranged from 1 (poor) to 4 (excellent), and the five items produced an alpha reliability coefficient of 0.82. We summed responses and dichotomized the resultant scale at the sample mean, creating a binary outcome indicating average or above future expectations. Previous studies have found similar scale means (O'Donnell, Schwab-Stone, & Mueeed, 2002).

3.4 Mediator Measures

Due to the exploratory nature of initial mediation analyses, we referenced applicable theory and empirical evidence when testing a number of potential measures as study mediators. A number of potential mediator measures were dropped based on inability to meet predetermined criteria. Tested yet excluded measures included indicators of family support

(e.g., parental monitoring and parent-child relationship) and school adjustment (e.g., grade point average and absenteeism). Variable paring through exploratory tests of mediation represents an “adaptive” means of specifying models and enhancing causal inference (MacKinnon, 2008).

Our mediators generally reflect a temporal sequence consistent with theoretical prediction and causal association. That is, the CLS measured the study mediators primarily in adolescence (ages 12–17). These time points correspond to the intervening period subsequent to the measurement of childhood maltreatment and prior to the measurement of young adult outcomes. We maximized the age/grade range for all mediator measures based on available data.

3.4.1 School moves and out-of-home home placements—Our indicator of family support indexes the number of *school moves and out-of-home home placements* a child experienced from grades 4 through 8. The CLS obtained school move data via grade-by-grade analyses of Chicago Public School system records. Number of out-of-home placements emanated from two sources: Cook County Juvenile Courts and the Illinois Department of Child Services. We characterized these data as proxies for a child’s exposure to unstable family life and aggregated them into one measure.

3.4.2 Reading achievement—We used *reading achievement in grade 8* as an indicator of cognitive functioning. Reading scores were measured with the Iowa Test of Basic Skills, a widely-used tool with sound properties (Hieronymus, Lindquist, & Hoover, 1980).

3.4.3 Acting out—As a distinct subscale of the Teacher Child Rating Scale (T-CRS), *acting out, grades 6–7* reflects teachers’ appraisals of children’s school behavior over two consecutive school years. The T-CRS was designed to assess students’ positive and negative socioemotional adjustment in middle school (Hightower, 2002). For the 6-item acting out subscale, teachers rated how often, from 1 (not at all) to 5 (much), a student displayed the following behaviors: disruptive in class; fidgety, difficulty sitting still; disturbs others while they are working; constantly seeks attention; overly aggressive to peers; and deviant, obstinate. These items reflect problems with externalizing behaviors, which have been linked directly to emotion dysregulation in adolescence (Mullin & Hinshaw, 2007). To arrive at a final variable, we summed items within grades and averaged scores between grades, relying on the score from one grade if only one existed. The subscale produced an alpha reliability coefficient above .90.

3.4.4 Peer social skills—For *peer social skills, grades 6–7*, also a T-CRS subscale, teachers rated how well a student demonstrated the following attributes on a scale from 1 (poor) to 5 (excellent): has many friends, is friendly toward peers, makes friends easily, classmates will sit near this child, and is well liked by classmates. We again summed results within grades, averaged scores between grades, and relied on the score from one grade if only one existed. The subscale produced an alpha reliability coefficient above .90. With test samples, Perkins and Hightower (2002) showed that the T-CRS is a reliable and valid indicator of youth adjustment.

3.4.5 Juvenile Delinquency—Our dichotomous measure of *juvenile delinquency* originated from official petitions to the juvenile courts in Cook County, Illinois and Milwaukee and Dane counties in Wisconsin. We accessed Milwaukee and Madison-area delinquency records given a number of CLS participants migrated to these urban centers during adolescence. The vast majority of participants with delinquency histories committed

offenses from ages 13–17. As argued, delinquency is a latent construct that captures processes related to moral development.

3.4.6 School commitment—To construct a measure of *school commitment, grades 5–6*, we extracted data from student surveys administered at the end of the grades 5 and 6 academic years. Sixteen identical items from each survey comprised the school commitment scale that indicates student attitudes toward and evaluations of their scholastic experience. Items include the following: I try hard in school, and I like school. Response categories range from 1 (not much) to 3 (a lot). Chronbach's alpha reliability coefficients for the grades 5 and 6 scales were .71 and .75, respectively. The two scales were summed and averaged. Again, we relied on scale scores from one grade if a student was missing data for the alternative grade.

3.4.7 College attendance expectation—We created a *college attendance expectation* measure from a 10th grade student survey item in which participants reported whether or not they expected to attend college. We supplemented these data with 12th grade student responses to this same question in order to create a dichotomous measure of college attendance expectation. The measure, like school commitment, reflected motivational development in our model.

3.4.8 Missing Data—Select mediators lacked valid data on a minority of cases due to differential attrition across assessment time points. Using an expectation-maximization algorithm (Schafer, 1997), we estimated missing values with multiple imputation in LISREL. This technique generates simulated values for missing observations. It draws on known associations between the measure in question and alternative study variables through examination of covariance matrices, variable means, and sample subsets with no missing data (du Toit & du Toit, 2001). The central tendencies, variation, and dispersion of the imputed measures resembled those of the originals. Our measure of juvenile delinquency had no missing data, while the mobility and reading achievement measures were missing values on less than 5% of cases, respectively. School commitment lacked data for 8.5% of the sample; 20% of cases were missing data on the indicators for acting out, peer social skills and college attendance expectations.

3.5 Child Maltreatment Measures

Child maltreatment records were aggregated from two sources: petitions to Cook County Juvenile Court and referrals to the Illinois Department of Child Services. From these data, we created a dichotomous explanatory variable denoting *any indicated maltreatment, ages 0–11* (see Reynolds & Robertson, 2003). Participants were coded 1 (n=104) if they had an indicated (i.e., substantiated) report in at least one of the two data sources within this age range. Additionally, we created a covariate measure of *any indicated maltreatment, ages 12–17 only*. A total of 48 participants experienced indicated maltreatment from ages 12–17 only.

3.6 Covariate Measures

We incorporated dichotomous measures of *CPC preschool participation* and *CPC school age participation* as exogenous covariates in our analytic models given evidence indicating that CPC attendance is associated with an array of favorable outcomes (e.g., Reynolds et al., 2007). We also controlled for *gender* (female=1, male=0) and *race/ethnicity* (AA=1, Hispanic non-White=0). Data for these measures came from official Chicago Public School records.

In order to account for socio-demographic variation between maltreatment groups, we included a *cumulative risk index* as a study covariate. This count variable, ranging from 0–7, consisted of the following items measured at or near the child's birth: (a) neighborhood poverty (40% residents below poverty level, 1980 Census), (b) single-parent household, (c) mother ever a teen parent, (d) mother did not complete high school, (e) four or more children living in family household, (f) family receipt of Temporary Assistance to Needy Families (TANF) or Aid to Families with Dependent Children (AFDC), and (g) mother not employed full or part-time. School records informed the neighborhood poverty measure; data from the Illinois Department of Human Services informed the public aid measure; and birth records from the Illinois Department of Public Health along with parent reports informed the remaining family measures (see Reynolds, 2000). Our analytic models also incorporated a dichotomous, retrospective self-report measure of *parental substance abuse*, ages 0–10.

3.7 Analysis Strategy

3.7.1 Question 1—Controlling for any indicated maltreatment, ages 12–17, we tested the adjusted main effect association between indicated maltreatment (ages 0–11) and a) the 5/7 resilience outcome and b) the 6/7 resilience outcome. Controlling for adolescent-only maltreatment helped to limit the comparison to the groups of interest. To assess for confounding effects of sample attrition, we conducted sensitivity tests in which the scores indicating propensity for study inclusion were entered as predictors for all main effect models.

We enlisted a multivariate probit regression strategy for main effect analyses. Probit uses a maximum likelihood estimator for models predicting dichotomous criterion measures. It generates reliable parameter estimates for large samples (Horowitz & Savin, 2001) and transforms these estimates into interpretable marginal effect coefficients, indicating the percentage-point change in the outcome corresponding to a one-unit change in the predictor.

3.7.2 Question 2—We completed several exploratory mediation steps and two confirmatory tests of mediation to address question 2 with the 5/7 resilience outcome. The more stringent 6/7 resilience outcome was highly skewed, with positive responses for only a select number of maltreatment cases. It therefore lacked power to reliably detect mediation effects.

To complete mediation analyses, we first conducted bivariate, Kendall's Tau rank double correlations to examine unadjusted relations between proposed mediators and the primary explanatory and outcome measures. Second, each proposed mediator was modeled as an outcome, and regressed on a set of predictors including the maltreatment measures (ages 0–11 and ages 12–17 only) along with the study covariates. Subsequently, all mediators significantly associated with maltreatment in the adjusted context were simultaneously entered into a one-step hierarchical regression model. Results were reviewed for adjusted associations between the mediators and the 5/7 adult resilience outcome along with attenuation of the original maltreatment-resilience link. Using Spostada software (see Long, 1997), we generated completely standardized beta weights to compare path estimates. We also conducted a test in which we entered the variable denoting propensity for study inclusion into the final mediator model. Our final model reflects a specification that was theoretically and empirically derived.

To confirm our mediator model, we employed structural equation modeling (SEM) with LISREL software (Joreskog & Sorbom, 1996). A set of equations in this block recursive approach was estimated simultaneously by maximum likelihood. Past updates to the LISREL program software facilitated use of maximum likelihood with categorical data

(Joreskog, Sorbom, du Toit, & du Toit, 1999). We generated completely standardized regression coefficients for direct and indirect paths of effect. We represented latent variables with single indicators, and included estimates of variable measurement errors to increase the accuracy of results. Path estimates were based on a polychoric covariance matrix generated from a PRELIS processor utilizing pairwise-present cases. We relied on a test statistic of 2.50 to convey statistical significance (α level of approximately .01) and report two indicators of model fit assessment: the root mean square error of approximation (RMSEA) and adjusted goodness-of-fit index (AGFI). RMSEA values below .05 and AGFI values above .90 reflect good fitting models (Reynolds & Ou, 2011). We first developed a full model and subsequently assessed contributions of individual mediators by cumulatively introducing each mediator variable to a direct effects-only baseline model. Select measures within the mediator block were allowed to covary, operations informed by theory and planned a priori.

4. Results

4.1 Question 1

Controlling for adolescent-only maltreatment, we found that the adjusted rate of young adult resilience among individuals maltreated as children was significantly lower compared to the rate of resilience among adults not maltreated as children: 20.9% versus 45.6% ($p < .000$). CLS participants who experienced childhood maltreatment from the ages of 0–11, therefore, were over 50% less likely to achieve our primary definition of resilience in early adulthood relative to their non-maltreated counterparts. When we defined resilience with the secondary resilience outcome, only 4.7% of adults maltreated as children realized this more stringent criterion for positive adjustment relative to 18.4% of adults with no verified childhood maltreatment record. Inclusion of the predictor denoting propensity for study sample inclusion did not alter findings.

4.2 Question 2

Results of bivariate double correlations (see the Table 2 correlation matrix) demonstrated that the retained mediator measures were significantly associated with the childhood maltreatment measure along with the 5/7 resilience measure. Table 3 shows results from our hierarchical regression analysis. When all mediators were entered into a model predicting the 5/7 resilience outcome, each retained a statistically significant ($p < .05$) association with resilience save for school commitment in grades 5–6, which exerted a marginally significant relation with the outcome ($p = .053$). This model did not fully mediate the childhood maltreatment-adult resilience link, though it attenuated the main-effect association by 62.5% and accounted for 23.0% of the variance in the outcome. Entering the predictor variable indicating propensity for study inclusion did not alter these mediation results.

A confirmatory test of our single block SEM model produced final results shown in Figure 1. Only paths significant at the .01 alpha level were depicted along with attendant standardized beta weights. Results revealed that all direct paths from childhood maltreatment to adolescent mediators were statistically significant. Direct paths of effect extended in turn from school moves, reading achievement, peer social skills, juvenile delinquency, and college attendance expectation to young adult resilience. The model fit the data well, given an RMSEA below .05 and an AGFI well above .90. The structural model explained 61% of the variance in the outcome, and reduced the original main-effect by 40%. A significant direct path remained from maltreatment to the outcome, indicating partial mediating.

Table 4 displays statistics associated with a set of cumulative mediator models that culminate in the full model described above. Insights into the relative contribution of each mediator based on a number of model parameters affirm that school commitment offers negligible mediation effects when added to the model, and the addition of acting out only modestly alters several model estimates. When added, juvenile delinquency provides the greatest contribution to the mediation model, while all other mediators furnish detectable effects as evidenced by increments in goodness-of-fit indices and/or decrements in the magnitude of the original main effect as measured by the standardized beta weight.

To further explore patterns of mediation, we tested a second SEM model after disaggregating the single mediator block into two periods: (a) early adolescence and (b) mid-to-late adolescence. We specified the following as first-block mediators given they were measured primarily from ages 10–13: school moves and out-of-home placements, reading achievement, acting out, peer social skills, and school commitment. Second block mediators included juvenile delinquency and college attendance expectation, measured primarily from ages 14–17.

As shown in Figure 2, reconfiguring the model did not alter the overall mediating effects, as a significant nexus between childhood maltreatment and adult resilience remained. However, now acting out and school commitment variables contributed to the model with significant paths leading to the penultimate outcomes. That is, acting out linked directly to juvenile delinquency and school commitment predicted college attendance expectation. In addition, school moves and out-of-home placements now only provided indirect mediation, while both reading achievement and peer social skills offered indirect *and* direct mediation. The emergence of new significant pathways yielded a corresponding improvement in model fit.

5. Discussion

5.1 Major Contributions

5.1.1 Question 1—Our study revealed that children experiencing childhood maltreatment were significantly less likely to demonstrate resilient functioning as young adults relative to their non-maltreated counterparts. A previous study from the CLS revealed that maltreatment, ages 0–17, was associated with deleterious effects across multiple young adult outcomes. The current study found that childhood-limited maltreatment exerted similar effects.

Current results supported hypotheses stating that maltreatment effects endure into adulthood and pervade across diverse domains. High profile studies from Felitti, Anda and colleagues (e.g., Felitti et al., 1998) suggest that maltreatment and related experiences influence long-term health-related outcomes and a convincing body of literature supports the long-term criminogenic effects of childhood maltreatment (e.g., Topitzes, Mersky, & Reynolds, 2011). Our study reaffirms these insights but also reveals that childhood maltreatment can potentially undermine adult human capital as indicated with educational attainment and earnings.

The enduring and pervasive effects of childhood maltreatment evidenced in this study are noteworthy for several reasons. First, the CLS sample is highly disadvantaged, comprised of racial/ethnic minority individuals who were raised in low-income households located in high-poverty neighborhoods. However, beyond these and other associated risk factors, childhood maltreatment appeared to introduce significant additive risk.

Second, consistent with Luthar and Zalazo's (2003) suggestion, we strove to operationalize resilient functioning as the fulfillment of reasonable standards given the level of risk faced. For instance, all but one outcome, college attendance, connoted average or below average performance. Nonetheless, only 20% of young adults maltreated as children were able to fulfill our relatively liberal standard of resilience (compared to approximately 45% of adults in the control group). When we created a more stringent criterion for resilience, increasing the qualifying number of positive outcomes from 5 to 6, the proportional disparity between the resilient maltreatment group (4.7%) and the resilient non-maltreatment group (18.4%) grew. That is, the percentage of resilient adults who did not experience early maltreatment was now over three times in magnitude of the percentage of resilient adults who experienced maltreatment. These results suggest that early maltreatment derails attainment of a set of relatively common developmental expectations among disadvantaged young adults.

Third, our measures of childhood maltreatment and young adult functioning were collected prospectively, from 10 to 24 years apart. Due to the dynamic nature of development, much can happen in these intervening years to introduce discontinuities in life-course trajectories. Despite the relatively long period of time between our indicator of childhood maltreatment and our measures of adult well-being, the majority of maltreatment victims appeared to have a difficult time recovering from this early adversity. While their functioning could improve beyond age 24 which might result in a change in their non-resilience designation, their young adult functioning reflects continuities with their early developmental experiences.

5.1.2 Question 2—Using a variable-centered approach to mediation, our exploratory analyses revealed that childhood maltreatment not only reduced one's chances of attaining a set of functional outcomes in adulthood but also increased one's chances of experiencing poor developmental outcomes in adolescence. Moreover, these adolescent problems helped to explain the link between childhood maltreatment and low adult functioning. It should be noted that school adjustment measures did not qualify as significant mediators of the main effect relation of interest. This null finding warrants attention and could be attributable to multicollinearity between grade 8 reading scores, our indicator of cognitive development, and school measures. Nonetheless, five discrete domains reflecting developmentally-salient adolescent outcomes were represented by seven measures in our final exploratory mediator model.

This general pattern of findings supports developmental theory. For instance, the ecological-transactional model of maltreatment stipulates that early developmental insults, i.e., those introduced by abuse and neglect, impair self-capacities such as basic representational and regulatory skills. In turn, a host of more complex developmental tasks and associated skills such as those reflected in our mediators become more difficult to master in adolescence. Barring discontinuities, maladaptive adult outcomes that extend directly from these adolescent deficits will result. Studies framed by the ecological-transactional model of maltreatment (see Cicchetti & Valentino, 2006) have validated this general view of maltreatment sequelae. However, few have done so with longitudinal data spanning 24 years.

Our confirmatory mediation results buttressed conclusions from our exploratory analyses. They indicated that the model fit the data well and reduced the main-effect relation of interest by an amount easily exceeding 30% or that which is considered practically significant (Cohen, Cohen, West, & Aiken, 2003). Moreover, all seven mediators that were retained from the exploratory mediation analyses contributed significantly to our SEM models.

Given the primary purpose of research question 2 is to flesh out adolescent experiences linking childhood maltreatment to adult adjustment, what follows is an examination of each mediator that survived our rigorous theory-driven, variable-pairing approach. Our first mediator, school mobility and out-of-home placements, has been implicated elsewhere in similar form as a predictor of poor outcomes among youth experiencing maltreatment (e.g., Herronkohl, Herronkohl, & Egolf, 2003). Residential or school mobility has been hypothesized to undermine relationship formation, impair regulatory systems, and promote behavioral problems (Kazak et al., 2010). Our results suggest that the effects of school or placement instability can extend into adulthood for maltreatment survivors.

Reading achievement test scores in grade 8 also emerged as a significant and robust mediator across model specifications. For instance, in the SEM context, it contributed medium-sized effects relative to other direct mediators. This finding supports evidence indicating that maltreatment can impair cognitive performance in adolescence (see Ayoub et al., 2006), which in turn can undermine a successful transition to adulthood. Results from our two-block mediator model suggested that the influence of cognitive performance in grade 8 on later development may manifest through non-cognitive domains, i.e., cascade effects (Masten et al., 2005).

Our indicators of socio-emotional development played prominent roles in study models. For instance, acting out fulfilled an indirect mediator role in our two-block model (see Figure 2). Behavioral dysregulation represents a relatively well-established consequence of maltreatment subtypes (Egeland, Yates, Appleyard, van Dulmen, 2002), and may help explain the long-term sequelae of child maltreatment through its association with subsequent delinquency.

Peer social skills functioned as a significant direct mediator, contributing modest effects. Previous research indicates that childhood maltreatment can disrupt the development of normative social skills and peer affiliations (Herrenkohl, Herrenkohl, & Egolf, 2003). Our findings reinforce the point and suggest that poor peer social skills in adolescence may help undermine the transition to young adulthood. The importance of peer affiliations for adolescent identity development may help explain this result (Collins & Laursen, 2004).

Aside from contributing direct mediation, peer social skills, like the acting out mediator, provided indirect mediation through juvenile delinquency in our two-block, SEM models. Additionally, we correlated the peer social skills and the acting out measures in the two-block model as a planned activity that resulted in improved model fit. Results suggest that the absence of positive social skills coupled with acting out behaviors predisposes disadvantaged adolescents maltreated as children toward delinquency.

Of all study mediators, juvenile delinquency furnished the strongest effects across models. In our initial SEM results (Figure 1), for instance, delinquency alone accounted for over 50% of the model's direct mediating effects. The link between child maltreatment and juvenile delinquency has been well-established (Mersky & Reynolds, 2007), and our current results along with cumulative work from prominent delinquency researchers (e.g., Thornberry, Krohn, Smith, Lizotte, & Porter, 2003) suggests that delinquency markedly disrupts the life course development of or strongly reinforces a negative life course trajectory among disadvantaged youth.

Last, our measures of motivational development also contributed to our SEM models. Based on our two-block solution, it appeared that poor scholastic motivation manifested in elementary school grades, persisted into high school, and affected adult adjustment. To specify, school commitment in grades 5–6 did not contribute direct mediating effects in the one-block SEM model but did in the two-block model through its connection to college

attendance expectation in grade 10. Therefore, childhood maltreatment appeared to lessen the chances that students would report commitment to elementary school processes, which in turn increased the chances one would report lower expectation to attend college during high school. Lower college expectations ultimately predicted non-resilience in young adulthood.

These motivational measures contributed to our mediation models independent of school performance. This is consistent with results from Williams et al. (2006) and suggests that motivation is a critical developmental domain for maltreated children. Other studies have affirmed the developmental importance of achievement motivation particularly among children facing poverty and/or maltreatment (e.g., Ou & Reynolds, 2008; Perkins & Jones, 2004).

5.2 Limitations

Three principal limitations qualify our findings. First, our explanatory measure indicated childhood maltreatment as reported and documented by public child-protection agencies and court records. Data such as these tend to under-report actual maltreatment incidence (Sedlak & Broadhurst, 1996), a type II error that could result in conservative estimates of relations tested. Due to limited sample, we also construed maltreatment as a uniform event. Therefore, we were unable to distill differential effects of common maltreatment subtypes.

Second, operationalizing our criterion measure posed challenges. For instance, the outcome domains chosen for inclusion in the original resilience measure reflected crucial yet non-exhaustive indicators of young adult adjustment. Also, the threshold with which we distinguished resilient versus non-resilient functioning is open to debate. We therefore informed our selection of resilience domains with extant studies from the field to bolster confidence in the validity of our measure. We also created a threshold for resilience that reflected previously published definitions and introduced an alternative resilience measure with a different threshold.

Last, lacking potentially salient mediator measures such as individual coping style and neurobiological functioning (see Rutter, 2007), we were unable to fully explain the relation between childhood maltreatment and young adult resilience. Our models only partially mediated this link. Nevertheless, insights rendered from the study can inform efforts to prevent maltreatment or ameliorate its effects given previously described study strengths.

5.3 Implications

Reinforcing the understanding that the impacts of child maltreatment are pervasive and enduring, our findings recommend effective prevention programming. Although maltreatment preventive interventions have proliferated over the past few decades, only a handful have been well-studied and shown to prevent maltreatment or valid proxies (see Reynolds, Mathieson, & Topitzes, 2009). Programming elements that contribute to prevention effects include: exposing participants to the intervention early in the child's life course, delivering the intervention with vested and trained professionals, providing opportunities for active engagement on the part of the parent or parent-child dyad, and offering services that address multiple levels of the child's ecology (Topitzes, Mersky, & Reynolds, in press). Rigorous evaluations with long-term follow-up assessments are required to translate these themes into validated, well-disseminated models.

Regarding implications for treatment interventions, our findings suggest that a broad range of adolescent factors exacerbate or potentially ameliorate the negative effects associated with childhood maltreatment. Results could inform systems that serve adolescents maltreated as children such as special education, mental health, juvenile justice and child

welfare (Howell, Kelly, Palmer, & Mangum, 2004). For instance, our mobility finding lends indirect support to interventions that show promise in promoting family or placement stability for maltreated youth. Parent child interaction therapy adapted for physically abusive families (Chaffin et al., 2004) with children ages 2–12 appears to help prevent out-of-home placement.

While we found that poor peer social skills and low college attendance expectation placed adolescents who had been maltreated in childhood at risk for poor adult adjustment, Edmond et al. (2006) discovered that peer social skills and college attendance expectation protected adolescents against the long-term effects of maltreatment. Therefore, we suggest that providers target social skill development and related identity formation along with future orientation when working with adolescents maltreated as children. Evidence-based interventions, such as trauma-focused cognitive-behavior therapy or cognitive-behavioral intervention for trauma in schools, do just this (see Cohen, Mannarino, & Deblinger, 2006; Stein et al., 2003).

The acting out and juvenile delinquency findings suggest that externalizing and antisocial behaviors of youth maltreated as children affect adult adjustment. The above-mentioned interventions are designed to mitigate these tendencies, however, youth whose dysregulated behavior eventuate in delinquent acts may require more ecologically-focused interventions such as multisystemic therapy (MST; Swenson & Chaffin, 2006) or more individually-focused interventions such as decompression treatment (Caldwell & Van Rybroek, 2001). The former targets behaviors manifesting within the ecology of the youth by altering environmental reinforcements associated with negative behaviors, thereby enhancing generalization of change. The latter isolates the individual within a highly controlled environment, thereby increasing the likelihood of shaping behaviors through consistent and potent reinforcements.

Most importantly, given the range of mediators implicated in our study, it appears that effective efforts to serve adolescents maltreated as children ought to be comprehensive. By this we mean that the menu of service or treatment choices should be somewhat broad. Nonetheless, experience suggests that service plans should be also be individually tailored. Several discrete interventions such as MST follow these dual principles of comprehensiveness and flexibility. We also think the common elements approach to youth mental health treatment (Weisz et al., 2012) and Trauma Systems Therapy (Saxe, Heidi, Ellis, Fogler, & Navalta, 2012) hold great promise in addressing maltreatment-related sequelae in part because they incorporate the comprehensive yet flexible standard into innovative, efficacious models.

5.4 Conclusion and Future Research

In sum, our findings emerged from theoretically-driven model specifications and prospectively collected data spanning several decades and multiple sources. Results revealed that childhood maltreatment was significantly and negatively associated with adult resilience. Key adolescent mechanisms that helped to explain the means by which maltreated CLS children failed to realize one definition of resilience in young adulthood included residential instability, low reading achievement, antisocial behavior, poor peer social skills, and low school commitment. These results buttress efforts to evaluate and disseminate promising prevention programming and also support the application of treatment models that target the very processes identified in this study as risk mechanisms. Further, the comprehensive nature of our final mediator model implies that a number of adolescent domains be assessed and targeted for treatment when providers work with adolescents manifesting the complex presentations associated with childhood maltreatment.

To further investigate resilience among adults maltreated as children, we foresee at least two additional studies from the CLS. First, because the number of CLS participants who were maltreated in childhood and subsequently attained young adult resilience was very small ($n=22$), we did not have the statistical power to examine the strategies this group used to overcome early adversity with variable-centered approaches. We therefore plan to explore these cases with person-centered methods, e.g., qualitative analyses with data collected in the adult survey. Second, we anticipate tracking resilience among CLS participants as they approach middle ages. We will gather data to reveal resilience beyond age 24 and compare these data to the current resilience measure given it accommodates future change. To specify, all measures contributing to the composite measure of resilience in this study could change in one direction and the majority of the indicators could change in either direction. Therefore, as we collect information about the adult development of CLS participants, we will be able to assess continuities and discontinuities in resilience among individuals maltreated in childhood. We will be able to focus this examination on transitions from young adulthood to middle adulthood.

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References

- Alink LRA, Cicchetti D, Kim J, Rogosch FA. Mediating and moderating processes in the relation between maltreatment and psychopathology: Mother-child relationship quality and emotion regulation. *Journal of Abnormal Child Psychology*. 2009; 37:831–843.
- Anthonyamy A, Zimmer-Gembeck MJ. Peer status and behaviors of maltreated children and their classmates in the early years of school. *Child Abuse & Neglect*. 2007; 31:971–991. [PubMed: 17875319]
- Aos, S.; Lieb, R.; Mayfield, J.; Miller, M.; Pennucci, A. Benefits and costs of prevention and early intervention programs for youth: Technical appendix. Olympia, WA: Washington State Institute for Public Policy; 2004. (No. 04-07-3901).
- Ayoub CC, O'Connor E, Rappolt-Schlichtmann G, Fischer KW, Rogosch FA, Toth SL, Cicchetti D. Cognitive and emotional differences in young maltreated children: A translational application of dynamic skill theory. *Development and Psychopathology*. 2006; 18:679–706. [PubMed: 17152396]
- Beauchaine TP, Neuhaus E, Brenner SL, Gatzke-Kopp L. Ten good reasons to consider biological variables in prevention and intervention research. *Development and Psychopathology*. 2008; 20:745–774. [PubMed: 18606030]
- Bolger KE, Patterson CJ. Developmental pathways from child maltreatment to peer rejection. *Child Development*. 2001; 72:549–568. [PubMed: 11333084]
- Bolger, KE.; Patterson, CJ. Sequalae of child maltreatment: Vulnerability and resilience. In: Luthar, SS., editor. *Resilience and vulnerability: Adaptation in the context of childhood adversities*. Cambridge, UK: Cambridge University Press; 2003. p. 156-181.
- Caldwell MF, Van Rybroek GJ. Efficacy of a decompression treatment model in the clinical management of violent juvenile offenders. *International Journal of Offender Therapy and Comparative Criminology*. 2001; 45:469–477.
- Chaffin M, Silovsky JF, Funderburk B, Valle LA, Brestan EV, Balachova T, Jackson S, Lensgraf J, Bonner BL. Parent-child interaction therapy with physically abusive parents: Efficacy for reducing future abuse reports. *Journal of Consulting and Clinical Psychology*. 2004; 72(3):500–510. [PubMed: 15279533]
- Chan YC, Yeung JWK. Children living with violence within the family and its sequel: A meta-analysis from 1995–2006. *Aggression and Violent Behaviour*. 2009; 14:313–322.

- Cicchetti D. An odyssey of discovery: Lessons learned through three decades of research on child maltreatment. *American Psychologist*. 2004; 59:731–741. [PubMed: 15554837]
- Cicchetti D, Lynch M. Toward an ecological/transactional model of community violence and child maltreatment: Consequences for children's development. *Psychiatry*. 1993; 56:96–118. [PubMed: 8488217]
- Cicchetti D, Rogosch FA. The role of self-organization in the promotion of resilience in maltreated children. *Development and Psychopathology*. 1997; 9:797–815. [PubMed: 9449006]
- Cicchetti, D.; Valentino, K. An ecological–transactional perspective on child maltreatment: Failure of the average expectable environment and its influence on child development. In: Cicchetti, D.; Cohen, D., editors. *Developmental psychopathology: Vol. 3. Risk, disorder, and adaptation*. 2nd ed.. Hoboken, NJ: Wiley; 2006. p. 129–201.
- Cohen, J.; Cohen, V.; West, SG.; Aiken, LS. *Applied multiple regression/correlation analysis for the behavioral sciences*. 3rd ed.. Mahwah, NJ: Lawrence Erlbaum Associates; 2003.
- Cohen, JA.; Mannarino, AP.; Deblinger, E. *Treating trauma and traumatic grief in children and adolescents*. New York: Guilford Press; 2006.
- Collins WA, Laursen B. Changing relationships, changing youth: Interpersonal contexts of adolescent development. *The Journal of Early Adolescence*. 2004; 24:55–62.
- Collishaw S, Pickles A, Messer J, Rutter M, Shearer C, Maughan B. Resilience to adult psychopathology following childhood maltreatment: Evidence from a community sample. *Child Abuse & Neglect*. 2007; 31:211–229. [PubMed: 17399786]
- Derogatis, LR. *Brief Symptom Inventory administration, scoring and procedures manual*. Minneapolis, MN: National Computer Systems; 1993.
- du Toit, M.; du Toit, S. *Interactive LISREL: User's Guide*. Lincolnwood, IL: Scientific Software International, Inc.; 2001.
- DuMont KA, Widom CS, Czaja SJ. Predictors of resilience in abused and neglected children grown-up: The role of individual and neighborhood characteristics. *Child Abuse & Neglect*. 2007; 31:255–274. [PubMed: 17386940]
- Edmond T, Auslander W, Elze D, Bowland S. Signs of resilience in sexually abused adolescent girls in the foster care system. *Journal of Child Sexual Abuse*. 2006; 15:1–28. [PubMed: 16551583]
- Egeland, B. Mediators of the effects of child maltreatment on the developmental adaptation in adolescence. In: Cicchetti, D.; Toth, SL., editors. *Developmental perspectives on trauma: Theory, research, and intervention*. Vol. 8. Rochester, NY: University of Rochester Press; 1997. p. 403–434.
- Egeland B, Yates T, Appleyard K, van Dulmen M. The long-term consequences of maltreatment in the early years: A developmental pathway model to antisocial behavior. *Children's Services: Social Policy, Research, and Practice*. 2002; 5:249–260.
- Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Apitz AM, Edwards, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *American Journal of Preventive Medicine*. 1998; 14:245–258. [PubMed: 9635069]
- Flores E, Cicchetti D, Rogosch FA. Predictors of resilience in maltreated and nonmaltreated Latino children. *Developmental Psychology*. 2005; 41:338–351. [PubMed: 15769190]
- Grogan-Kaylor A, Ruffolo MC, Ortega RM, Clarke J. Behaviors of youth involved in the child welfare system. *Child Abuse & Neglect*. 2008; 32:35–49. [PubMed: 18155294]
- Haskett ME, Nears K, Ward CS, McPherson AV. Diversity of adjustment in maltreated children: Factors associated with resilient functioning. *Clinical Psychology Review*. 2006; 26:796–812. [PubMed: 16797807]
- Herrenkohl EC, Herrenkohl RC, Egolf BP. The psychological consequences of living environment instability on maltreated children. *American Journal of Orthopsychiatry*. 2003; 73:367–380. [PubMed: 14609399]
- Herrenkohl TI, Herrenkohl RC, Egolf B. Resilient early school-age children from maltreating homes: Outcomes from late adolescence. *American Journal of Orthopsychiatry*. 1994; 64:301–309. [PubMed: 8037238]
- Hieronymus, AN.; Lindquist, EF.; Hoover, HD. *Iowa Tests of Basic Skills: Primary Battery*. Chicago: Riverside; 1980.

- Horowitz JL, Savin NE. Binary response models: Logit, probits and semiparametrics. *Journal of Economic Perspectives*. 2001; 15(4):43–57.
- Howell JC, Kelly MR, Palmer J, Mangum RL. Integrating child welfare, juvenile justice, and other agencies in a continuum of services. *Child Welfare*. 2004; 83:143–156. [PubMed: 15068216]
- Hyman B, Williams L. Resilience among women survivors of child sexual abuse. *Affilia*. 2001; 16:198–219.
- Iwaniec D, Larkin E, Higgins S. Research review: Risk and resilience in cases of emotional abuse. *Child and Family Social Work*. 2006; 11:73–82.
- Jaffee SR, Caspi A, Moffitt TE, Polo-Tomasc M, Taylor A. Individual, family, and neighborhood factors distinguish resilient from non-resilient maltreated children: A cumulative stressors model. *Child Abuse & Neglect*. 2007; 31:231–253. [PubMed: 17395260]
- Jessor, R.; Donovan, JF.; Costa, FM. *School health study*. Boulder: Institute of Behavioral Science, University of Colorado; 1989.
- Joreskog, K.; Sorbom, D. *LISREL 8: User's reference guide*. Chicago: Scientific Software International; 1996.
- Joreskog, K.; Sorbom, D.; Du Toit, S.; Du Toit, M. *LISREL 8: New statistical features*. Chicago: Scientific Software International, Inc.; 1999.
- Kaufman JYBZ, Douglas-Palumberi H, Houshyar S, Lipschitz D, Krystal JH, Gelernter J. Social supports and serotonin transporter gene moderate depression in maltreated children. *Proceedings of the National Academy of Sciences*. 2004; 101:17316–17321.
- Kazak AE, Hoagwood K, Weisz JR, Hood K, Kratchwill TR, Vargas LA, Banez GS. A meta-systems approach to evidence-based practice for children and adolescents. *American Psychologist*. 2010; 65:85–97. [PubMed: 20141264]
- Kim J, Cicchetti D. Longitudinal trajectories of self-system processes and depressive symptoms among maltreated and nonmaltreated children. *Child Development*. 2006; 77:624–639. [PubMed: 16686792]
- Kim J, Cicchetti D. Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. *Journal of Child Psychology and Psychiatry*. 2010; 51:706–716. [PubMed: 20050965]
- Kinard EM. Methodological issues in assessing resilience in maltreated children. *Child Abuse & Neglect*. 1998; 22:669–680. [PubMed: 9693845]
- Koenig AL, Cicchetti D, Rogosch FA. Moral development: The association between maltreatment and young children's prosocial behaviors and moral transgressions. *Social Development*. 2004; 13:87–106.
- Long, JS. *Regression models for categorical and limited dependent variables*. Advanced quantitative techniques in the social sciences. Thousands Oaks, CA: Sage Publications; 1997.
- Luthar SS, Brown PJ. Maximizing resilience through diverse levels of inquiry: Prevailing paradigms, possibilities, and priorities for the future. *Developmental Psychopathology*. 2007; 19:931–955.
- Luthar, SS.; Zelazo, LB. Research on resilience: An integrative review. In: Luthar, SS., editor. *Adaptation in the context of childhood adversities*. New York, NY: Cambridge University Press; 2003.
- McGloin J, Widom C. Resilience among abused and neglected children grown up. *Development and Psychopathology*. 2001; 13:1021–1038. [PubMed: 11771905]
- MacKinnon, DP. *Introduction to Statistical Mediation Analysis*. Boca Raton, FL: CRC Press; 2008.
- Masten AS, Cutuli JJ, Herbers JE, Reed MG. Resilience in Development. *Oxford handbook of positive psychology*. 2009:117.
- Masten AS. Resilience in developing systems: Progress and promise as the fourth wave rises. *Development and Psychopathology*. 2007; 19:921–930. [PubMed: 17705908]
- Masten AS, Roisman GI, Long JD, Burt KB, Obradovic J, Roberts JM, Boelcke K, Tellegen A. Developmental cascades: Linking academic achievement, externalizing and internalizing symptoms over 20 years. *Developmental Psychology*. 2005; 41:733–746. [PubMed: 16173871]
- Mersky JP, Topitzes J. Comparing early adult outcomes of maltreated and Non-maltreated children: A prospective longitudinal investigation. *Children and Youth Services Review*. 2010; 32:1086–1096.

- Mersky JP, Reynolds AJ. Child maltreatment and violent delinquency: Disentangling main effects and subgroup effects. *Child Maltreatment*. 2007; 12:246–258. [PubMed: 17631624]
- O'Donnell DA, Schwab-Stone ME, Mueeed AZ. Multidimensional resilience in urban children exposed to community violence. *Child Development*. 2002; 73:1265–1282. [PubMed: 12146747]
- Ou S, Reynolds AJ. Predictors of educational attainment in the Chicago Longitudinal Study. *School Psychology Quarterly*. 2008; 23:199–229.
- Pepin EN, Banyard VL. Social support: A mediator between child maltreatment and developmental outcomes. *Journal of Youth and Adolescence*. 2006; 35:617–630.
- Perkins DF, Jones KR. Risk behaviors and resiliency within physically abused adolescents. *Child Abuse & Neglect*. 2004; 28:547–563. [PubMed: 15159069]
- Perkins, PE.; Hightower, AD. T-CRS 2.1 teacher child rating scale: Examiner's manual. Rochester, NY: Children's Institute; 2002.
- Reynolds, AJ. Success in early intervention: The Chicago Child-Parent Centers. Lincoln, NE: University of Nebraska Press; 2000.
- Reynolds AJ, Mathieson L, Topitzes J. Can early childhood intervention prevent child maltreatment? A review of research. *Child Maltreatment*. 2009; 14(2):182–206. [PubMed: 19240245]
- Reynolds AJ, Ou SR. Paths of effects from preschool to adult well-being: A confirmatory analysis of the Child-Parent Center Program. *Child development*. 2011; 82:555–582. [PubMed: 21410923]
- Reynolds AJ, Robertson D. School-based early intervention and later child maltreatment in the Chicago Longitudinal Study. *Child Development*. 2003; 74(1):3–26. [PubMed: 12625433]
- Reynolds AJ, Temple JA, Ou S, Robertson DL, Mersky JP, Topitzes JW, Niles MD. Effects of a School-Based, Early Childhood Intervention on Adult Health and Well Being: A 19-Year Follow Up of Low-Income Families. *Archives of Pediatrics & Adolescent Medicine*. 2007; 161:730–739. [PubMed: 17679653]
- Rutter M. Commentary: Resilience, competence, and coping. *Child Abuse & Neglect*. 2007; 31:205–209. [PubMed: 17408738]
- Ryan JP, Testa MF. Child maltreatment and juvenile delinquency: Investigating the role of placement instability. *Children and Youth Services Review*. 2005; 27:227–249.
- Saxe GN, Heidi Ellis B, Fogler J, Navalta CP. Innovations in Practice: Preliminary evidence for effective family engagement in treatment for child traumatic stress—trauma systems therapy approach to preventing dropout. *Child and Adolescent Mental Health*. 2012
- Schafer, JL. Analysis of incomplete data. London: Chapman and Hall; 1997.
- Sedlak, AJ.; Broadhurst, DD. Third National Incidence Study of Child Abuse and Neglect: Final Report. Washington, DC: US Department of Health and Human Services; 1996.
- Sousa C, Herrenkohl TI, Moylan CA, Tajima EA, Klika JB, Herrenkohl RC, Russo MJ. Longitudinal study on the effects of child abuse and children's exposure to domestic violence, parent-child attachments, and antisocial behavior in adolescence. *Journal of Interpersonal Violence*. 2011; 26:111–136. [PubMed: 20457846]
- Sapientza JK, Masten AS. Understanding and promoting resilience in children and youth. *Current Opinion in Psychiatry*. 2011; 24:267–273. [PubMed: 21546838]
- Stein BD, Jaycox LH, Kataoka SH, Wong M, Tu W, Elliott MN, Fink A. A mental health intervention for schoolchildren exposed to violence: A randomized controlled trial. *JAMA: Journal of the American Medical Association*. 2003; 290:603–611.
- Stuewig J, McCloskey LA. The relation of child maltreatment to shame and guilt among adolescents: Psychological routes to depression and delinquency. *Child Maltreatment*. 2005; 10:324–336. [PubMed: 16204735]
- Swenson CC, Chaffin M. Beyond psychotherapy: Treating abused children by changing their social ecology. *Aggression and Violent Behavior*. 2006; 11:120–137.
- Tarry H, Emler H. Attitudes, values and moral reasoning as predictors of delinquency. *British Journal of Developmental Psychology*. 2007; 25(2):169–183.
- Thornberry, TP.; Krohn, MD.; Smith, CA.; Lizotte, AJ.; Porter, PK. Causes and consequences of delinquency: Findings from the Rochester Youth Development Study. In: Thornberry, TP.; Krohn,

- MD., editors. Taking stock of delinquency: An overview of findings from contemporary longitudinal studies. New York: Kluwer Academic/Plenum Publishers; 2003. p. 11-46.
- Topitzes J, Mersky JP, Reynolds AJ. Child maltreatment and adult cigarette smoking: An examination of a long-term developmental model. *Journal of Pediatric Psychology*. 2010; 35:484-498. [PubMed: 19995869]
- Topitzes J, Mersky JP, Reynolds AJ. Child maltreatment and offending behavior: Gender specific effects and pathways. *Criminal Justice & Behavior*. 2011; 38:492-510.
- Topitzes, J.; Mersky, JP.; Reynolds, AJ. Maltreatment prevention programming in early childhood: A review of models delivered in center-based settings. In: Alexander, R.; Guterman, N.; Alexander, S., editors. *Child maltreatment prevention*. St. Louis, MO: STM Learning, Inc; (in press).
- U.S. Census Bureau. Current Population Survey: Annual Social and Economic Supplement. Washington, DC: U.S. Census Bureau; 2004.
- Walsh WA, Dawson J, Mattingly MJ. How are we measuring resilience following childhood maltreatment? Is the research adequate and consistent? What is the impact on research, practice, and policy? *Trauma, Violence, & Abuse*. 2010; 11:27-41.
- Weisz JR, Chorpita BF, Palinkas LA, Schoenwald SK, Miranda J, Bearman SK. The Research Network in Youth Mental Health. Testing standard and modular designs for psychotherapy treating depression, anxiety, and conduct problems in youth: A randomized effectiveness trial. *Archives of General Psychiatry*. 2011; 69:274-282. [PubMed: 22065252]
- Werner, EE. Handbook of resilience in children. New York, NY: Springer Science; 2005. What can we learn about resilience from large-scale longitudinal studies?; p. 91-106.
- Widom, CS. Understanding the consequences of childhood victimization. In: Reese, R., editor. *Treatment of child abuse*. Baltimore, MD: Johns Hopkins University Press; 2000. p. 339-361.
- Williams S, MacMillan H, Jamieson E. The potential benefits of remaining in school on the long-term mental health functioning of physically and sexually abused children: Beyond the academic domain. *American Journal of Orthopsychiatry*. 2006; 76:18-22. [PubMed: 16569122]
- Wolfe DA, Crooks CC, Chiodo D, Jaffe P. Child maltreatment, bullying, gender-based harassment, and adolescent dating violence: Making the connections. *Psychology of Women Quarterly*. 2009; 33:21-24.

Highlights

- We assessed adjusted relations between childhood maltreatment and adult resilience.
- Childhood maltreatment significantly and negatively predicated adult resilience.
- Seven adolescent measures helped mediate the maltreatment-resilience link.
- Strengths of the study included prospective measurement design.
- Results support theoretical predications and inform intervention choices.

Figure 1.
 LISREL generated mediation model explaining maltreatment to young adult resilience.*
 *Non-significant pathways not drawn.

Figure 2.

LISREL generated mediation model explaining maltreatment to young adult resilience, with a second mediator block.*

*Non-significant pathways not drawn.

Table 1

Descriptive Statistics for Primary Study Variables and Descriptive Attrition Analysis

Variable	Range	Mean/Rate (Standard Deviation)		
	Study sample N=1,182	Original sample N=1,539	Study sample N=1,182	Attrition sample N=357
<u>Control Variables</u>				
Gender	0–1	0.50 (0.50)	0.52 (0.50)	0.45 (0.50) *
Race	0–1	0.93 (0.26)	0.94 (0.24)	0.89 (0.31) *
Parental substance abuse, ages 0–10	0–1	--	0.06 (0.24)	--
Risk index, ages 0–3	0–7	3.58 (1.69)	3.62 (1.66)	3.45 (1.76)
-Neighborhood poverty > 40%	0–1	0.46 (0.50)	0.46 (0.50)	0.45 (0.50)
-Single parent household	0–1	0.77 (0.42)	0.77 (0.42)	0.74 (0.44)
-Mother ever a teen parent	0–1	0.36 (0.48)	0.38 (0.48)	0.29 (0.45) *
-Mother did not complete high school	0–1	0.54 (0.50)	0.54 (0.50)	0.55 (0.50)
-4 or more children in household	0–1	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)
-TANF/AFDC participation	0–1	0.63 (0.48)	0.63 (0.48)	0.61 (0.49)
-Mother not employed	0–1	0.66 (0.47)	0.67 (0.47)	0.65 (0.48)
CPC preschool participation	0–1	0.64 (0.48)	0.65 (0.48)	0.63 (0.48)
CPC school age participation	0–1	0.55 (0.50)	0.57 (0.50)	0.49 (0.50) *
<u>Explanatory Variable</u>				
Indicated maltreatment, ages 0–11	0–1	0.09 (0.29)	0.09 (0.28)	0.08 (0.27)
<u>Mediator Variables</u>				
School moves & out-of-home, grades 4–8	0–10	1.04 (1.13)	1.03 (1.16)	--
Reading achievement, grade 8	77–212	144.83 (20.97)	144.59 (21.86)	--
Acting out, grades 6–7	6–30	12.45 (5.70)	12.34 (5.90)	--
Peer social skills, grades 6–7	5–25	16.66 (3.93)	16.76 (4.31)	--
Juvenile delinquency	0–1	0.20 (0.40)	0.22 (0.41)	--
School commitment, grades 5–6	24–64.5	50.34 (5.36)	50.42 (5.54)	--
College attendance expectation, grade 10	0–1	0.79 (0.41)	0.78 (0.42)	--
<u>Outcome Variables</u>				
Adult resilience, 5 or more pos. outcomes	0–1	--	0.44 (0.50)	--
Adult resilience, 6 or more pos. outcomes	0–1	--	0.21 (0.40)	--
-High school completion, by age 23	0–1	0.68 (0.47)	0.64 (0.48)	--
-College attendance, by age 23	0–1	0.14 (0.35)	0.14 (0.35)	--
-Incarceration, ages 18–24	0–1	0.17 (0.38)	0.19 (0.39)	--
-Average income, ages 20–24	0–1	0.28 (0.45)	0.28 (0.45)	--
-Substance abuse, ages 16–24	0–1	--	0.08 (0.28)	--
-Depressive symptoms, ages 22–24	0–1	--	0.12 (0.33)	--
-Future expectations, ages 22–24	0–1	--	0.48 (0.50)	--

* Statistically significant group differences ($p < .05$) between study sample and attrition sample at the bivariate level.

--Descriptive statistics were not calculated for this cell given lack of available data or of need for subsample comparisons.

Table 2

Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Gender	1.00															
2. Race	.027	1.00														
3. Parental substance abuse, ages 0–10	.008	.023	1.00													
4. Risk index, ages 0–3	.001	.125*	.041	1.00												
5. CPC preschool participation	.059*	.000	.053*	.017	1.00											
6. CPC school-age participation	.009	.022	.023	.012	.390*	1.00										
7. Indicated maltreatment, ages 0–11	.015	.030	.129*	.087*	-.057*	-.043	1.00									
8. School moves & out-of-home, grades 4–8	-.076*	-.006	.091*	.133*	-.149*	-.134*	.212*	1.00								
9. Reading achievement, grade 8	.163*	-.043*	.047*	-.151*	.127*	.094*	-.067*	-.214*	1.00							
10. Acting out, grades 6–7	-.275*	.062*	.007	.130*	-.071*	-.031	.057*	.130*	-.278*	1.00						
11. Peer social skills, grades 6–7	.127*	-.036	-.003	-.093*	.084*	.036	-.069*	-.215*	.330*	-.503*	1.00					
12. Juvenile delinquency	-.331*	.008	.057*	.095*	-.100*	-.016	.078*	.172*	-.188*	.241*	-.157*	1.00				
13. School commitment, grades 5–6	.137*	-.010	.008	-.052*	.101*	.049*	-.054*	-.092*	.374*	-.255*	.323*	-.146*	1.00			
14. College attendance expectation, grade 10	.117*	-.005	-.003	-.099*	.060*	.008	-.051*	-.140*	.207*	-.096*	.155*	-.166*	-.161*	1.00		
15. Adult resilience, 5 or more pos. outcomes	.208*	-.044	-.035	-.183*	.090*	.036	-.143*	-.177*	.311*	-.268*	.267*	-.329*	.207*	.229*	1.00	
16. Adult resilience, 6 or more pos. outcomes	.119*	-.101*	.001	-.159*	.069*	.032	-.110*	-.222*	.277*	-.215*	.218*	-.202*	.210*	.155*	.578*	1.00

* p .05 Emboldened cells identify salient results for the exploratory double correlation test of mediation.

Table 3

Hierarchical Regression Results Depicting Child Maltreatment to Adult Resilience (N=1,182)

Predictors	Main Effect*	Mediation Effect*
Maltreatment, ages 0–11	Beta = $-.178$ ($p < .000$)	Beta = $-.087$ ($p = .017$)
School moves & out-of-home, grades 4–8	--	Beta = $-.133$ ($p = .001$)
Reading achievement, grade 8	--	Beta = $.201$ ($p < .000$)
Acting out, grades 6–7	--	Beta = $-.104$ ($p = .007$)
Peer social skills, grades 6–7	--	Beta = $.112$ ($p = .002$)
Juvenile delinquency	--	Beta = $-.221$ ($p < .000$)
School commitment, grades 5–6	--	Beta = $.067$ ($p = .053$)
College attendance expectation, grade 10	--	Beta = $.108$ ($p = .001$)
% Reduce main effect	--	62.5%
Pseudo- R^2	9.3%	23.0%

* Study covariates were entered into both regression models.

Table 4
LISREL Goodness-of-Fit and Direct Effect Statistics for Cumulative Mediator Models

Model	df	X ²	X ² change	RMSEA	AGFI	Std. Beta ^{**}
1. Baseline	27	582.75	-	.129	0.75	-0.34
2. 1 + mobility [*]	26	538.94	43.81	.125	0.77	-0.25
3. 2 + reading achievement	25	382.62	156.32	.109	0.82	-0.24
4. 3 + acting out	24	337.34	45.28	.105	0.83	-0.22
5. 4 + peer social skills	23	302.33	35.01	.102	0.84	-0.22
6. 5 + juvenile delinquency	22	101.29	201.04	.055	0.94	-0.15
7. 6 + school commitment	21	99.87	1.42	.056	0.94	-0.15
8. 7 + college expectation	20	61.68	38.19	.042	0.96	-0.16

^{*} Mobility signifies *school moves and out of home placement, grades 4–8.*

^{**} Standardized Beta weight for the direct effect from *childhood maltreatment, ages 0–11, to adult resilience, 5 or more positive outcomes.*