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An Examination of Exposure to Traumatic Events and Symptoms and Strengths for Children Served in a Behavioral Health System of Care

Melissa L. Whitson
University of New Haven, mwhitson@newhaven.edu

Christian M. Connell
Yale University

Stanley N. Bernard
Southern Connecticut State University

Joy S. Kaufman
Yale University

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Abstract

The present study examined how exposure to traumatic events impacts children with severe emotional disturbance who are being served in a school-based system of care. Multilevel growth curve models were used to examine the relationships between a child's history of traumatic events (physical abuse, sexual abuse, or domestic violence) and behavioral and emotional strengths, internalizing problem behaviors, or externalizing problem behaviors over 18 months. Results indicate that children receiving services (N = 134) exhibited increased emotional and behavioral strengths and decreased internalizing and externalizing problem behaviors from enrollment to 18 months follow-up. Children with a history of traumatic events improved more slowly than children without such a history on both strengths and internalizing problem behaviors, even after controlling for dosage of services received and other characteristics previously found to predict outcomes. Gender was also related to improvement in internalizing symptoms. Results highlight the continued need to assess the impact of exposure to traumatic events for children served in a system of care.

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Emerging data about the prevalence of childhood trauma, such as

exposure to physical abuse, sexual abuse, and domestic violence, has led

researchers to characterize it as an urgent public health problem (Van der Kolk,

2005) that is largely a preventable cause of mental illness and health problems

later in adulthood (Felitti, 2009; Sharfstein, 2006). Each year, exposure to

traumatic events impacts the development of millions of children. Studies indicate

that 51 to 71% of youth are exposed to potentially traumatic events (Copeland,

Keeler, Angold, & Costello, 2007; Fairbank, 2008; Finkelhor, Ormrod, Turner, &

Hamby, 2005; Kessler, Sonnega, Bromet, Hughes, & et al., 1995). The National

Survey of Children's Exposure to Violence involved 4,549 children and

adolescents and found that more than 60% had been exposed to violence in the

past year. Lifetime rates as reported by the youth or caregivers (if youth were

younger than 10 years old) revealed that 56.7% had been physical assaulted,

37.8% had witnessed interpersonal violence, 18.6% were maltreated, 9.8% were

sexually victimized, and 9.8% had witnessed family violence in the past year

(Finkelhor, Turner, Ormrod, Hamby, & Kracke, 2009).

The cumulative impact of exposure to traumatic events can negatively

affect multiple domains of a child's functioning (Cook et al., 2005). Studies have

revealed high rates of emotional and behavioral problems among children with

trauma (physical abuse, sexual abuse, and neglect) histories (Burns et al., 2004;

Kolko, 1996; Walrath, Ybarra, Sheehan, Holden, & Burns, 2006). A higher

incidence and severity of trauma exposure was found to be related to higher levels of psychopathology (e.g., anxiety, depression, posttraumatic stress disorder), alcohol and drug abuse, functional impairments (e.g., disruption of important relationships, school problems), and violent behavior (Fairbank, 2008; Harris et al., 2007). Epidemiological evidence demonstrates that when the experience of trauma goes unaddressed, childhood exposure to trauma has negative consequences that increase the risk for lifelong problems including substance use, suicide attempts, sexually transmitted diseases, depression, posttraumatic stress disorder (PTSD), low occupational attainment, and poor physical health (Felitti et al., 1998).

In spite of these serious consequences, the majority of the childhood trauma research has focused on children in the child welfare system and not on those who may be experiencing some negative effects of exposure to traumatic events as evidenced by their receiving services in community-based behavioral health programs. Focusing on children who are being served by community-based behavioral health programs provides information that may be helpful in understanding how effective these services are for children exposed to traumatic events and whether adjustments to service delivery are necessary to better meet the needs of this population (Walrath et al., 2006).

Systems of Care for Children/Youth with Severe Social, Emotional, and/or Behavioral Challenges or Severe Emotional Disturbance

The ecological context in which childhood trauma exists, which includes multiple systems and people, suggests that targeting the needs of traumatized children must include attention to the child, the family, and the environment and

reaching beyond the child's individual clinical needs to enlist a range of coordinated services for the child and the family (Harris et al., 2007). Children's behavioral health systems of care were developed in response to the need for more appropriate and accessible preventive and treatment services for children with severe emotional and behavioral difficulties and their families. Central to the philosophy of systems of care are community-based alternatives to out-of-home placements, family involvement, cultural sensitivity, and interagency collaboration (Stroul & Friedman, 1986). More than 70,000 children and their families have received services through the Community Mental Health Services Program for Children and Their Families (CMHS) Program (Miech et al., 2008). Research on behavioral health systems has demonstrated positive outcomes at both the individual child (Anderson, Wright, Kelley, & Kooreman, 2008; Graves, 2005; Kaufman et al., 2008) and service system levels (Bickman, Noser, & Summerfelt, 1999; Foster, Stephens, Krivelyova, & Gyamfi, 2007; Tebes et al., 2005).

Despite these promising findings, there is inconsistent attention to the role of trauma on children's trajectories of clinical and functional outcomes over time, as well as to what variables might moderate whether or not systems of care are effective in reducing emotional and behavioral symptoms and enhancing emotional and behavioral strengths. This study seeks to address this gap in the literature by examining these trajectories for children in systems of care who have been exposed to traumatic events. Children in systems of care have severe emotional and behavioral health issues that may have resulted, at least for some, from exposure to trauma and how their parents/caregivers reacted to the exposure

(Crusto et al., 2009; Zeanah, Bailey, & Berry, 2009). Therefore, understanding the impact of trauma on functioning and outcomes for children with severe emotional and behavioral difficulties will be helpful in gearing services to this population.

The national evaluation of the CMHS collects information about children and families enrolled in systems of care. A review of the data from communities funded in 2002 and 2004 (N = 1,157) revealed that over 75% of youth had experienced at least one of six indicators of trauma or a PTSD diagnosis: 23% had a history of physical abuse; 19% had a history of sexual abuse; 46% were exposed to domestic violence; 34% had seen a violent crime in neighborhood; 29% knew someone who was a victim of a violent crime; and 10% reported that they were a victim of a violent crime. Among youth who had experienced trauma, 83.1% had symptoms of problem behaviors that fell within clinical range at baseline (compared to 68% for youth who did not experience trauma; $p < .001$), 81.8% had externalizing problem behaviors and 64.7% had internalizing problem behaviors in the clinical range at baseline (compared to 63.1% and 50.9% for youth without trauma histories; $p < .001$). Moreover, 83.6% had global impairment scores within clinical range at baseline, compared to 73% for youth without a trauma history ($p < .001$; Macro International Inc., 2007).

Another study using the CMHS national evaluation data from 45 communities initially funded between 1997 and 2000 (N = 3,678) examined youth who had histories of physical abuse, sexual abuse, or both. More than 1/3 (36%) had a caregiver-reported history of abuse (13% physical abuse; 11% sexual abuse; 13% both types). The authors examined characteristics that were associated with children who had a history of maltreatment compared to children who did not.

Their results revealed a number of family risk factors, including substance use, domestic violence, family mental illness, and a household income at or below the poverty level, that were consistently associated with high rates of all abuse types. After controlling for significant demographic, psychosocial, and service-use risk factors, youth with abuse histories had significantly higher levels of problem behaviors at baseline and reported more externalizing and internalizing problems at six months than those with no abuse history. Moreover, all youth in the study exhibited a reduction in internalizing symptoms over six months of system-of-care enrollment, but average adjusted improvement was significantly greater for children with abuse histories. The rates of change for externalizing problems were not significantly different from those youth without abuse histories (Walrath et al., 2006). Although this study provides important information about children with trauma histories in systems of care, it is limited in that it only includes histories of physical abuse or sexual abuse as traumatic events, problem behaviors as an outcome, and largely cross-sectional data with the rates of change measured using just two time points (baseline and at 6 months). The present study seeks to address these, as well as additional gaps in the literature.

Exposure to Trauma for Children Served in Systems of Care

The literature on children's exposure to trauma and service outcomes has a number of gaps that need to be addressed in order to understand, identify, and more effectively serve trauma-exposed children and their families. First, as mentioned, the majority of the childhood trauma research has focused on children in the child welfare system, which is a limited sample as it includes only those children who have come to the attention of the child protection system. Focusing

on children who are being served by community-based behavioral health programs, many of whom may have been exposed to traumatic events, will expand the knowledge base (Walrath et al., 2006).

Second, research on clinical outcomes of children exposed to trauma has primarily been focused on children with histories of maltreatment (i.e., physical abuse and sexual abuse). Nearly 30% of American children live in families in which domestic violence has occurred in the previous year (McDonald, Jouriles, Ramisetty-Mikler, Caetano, & Green, 2006), and exposure to domestic violence has been recognized as a traumatic event that is significantly related to negative outcomes, such as elevated posttraumatic stress symptoms (McCloskey & Walker, 2000). The inclusion of exposure to domestic violence provides a more comprehensive understanding of the impact of trauma exposure.

Third, there has been a growing interest in strengths-based assessment to inform intervention for children with trauma histories and emotional or behavioral difficulties to balance the traditional deficit-focused assessments (Epstein, Ryser, & Pearson, 2002). A central tenant of the wraparound approach in systems of care is strengths-based services, which necessitates assessment of children's strengths and how those strengths change while children are enrolled in a system of care. To our knowledge, there are no studies that have assessed how exposure to traumatic events moderates the change in emotional and behavioral strengths over time for children receiving behavioral health services.

In addition, the research on systems of care has been limited by a lack of longitudinal data. In one of the few papers examining longitudinal outcomes for this population, Anderson and colleagues (2008) recently reported on clinical

outcomes (including strengths) for youth served in a system of care. Although the study demonstrated how demographic characteristics were related to longitudinal trajectories, it did not include history of trauma exposure. Longitudinal studies are necessary to demonstrate that improvements are maintained during and after receiving system-of-care services. Moreover, the effectiveness of systems of care will become more apparent with additional research from local communities implementing systems of care (Foster et al., 2007), and the present study seeks to address this need.

Finally, although clinically and statistically significant improvements have been found for children served in a system of care even after controlling for individual-level differences such as age, race, gender, and referral source (Anderson et al., 2008), the impact of dosage of services received within a system of care on these outcomes has not been tested. This study will examine outcomes within a system of care while controlling for individual-level differences and dosage of services received.

Purpose of the Study

The current study seeks to expand on prior research by examining the relationships between trauma histories (caregiver-reported incidents of physical abuse, sexual abuse, or witnessing domestic violence) and emotional and behavioral strengths or problem behaviors 18 months after enrollment into a local behavioral health system of care. The results will provide a more comprehensive understanding of how trauma exposure impacts children during and after service reception with the goal of increasing the capacity of systems of care to meet the needs of this growing population.

Hypotheses

Using multilevel growth curve models, the present study examines how children's exposure to traumatic events (i.e., physical abuse, sexual abuse, domestic violence) affects children with severe emotional disturbance enrolled in a system of care. The analyses sought to answer the following research questions:

1) To what extent do these children vary in baseline levels of strengths and problem behaviors, and to what extent do these children vary in their rate of change for strengths and problem behaviors?

2) What is the relationship between whether or not a child has a history of exposure to traumatic events and baseline levels of each outcome, and what is the relationship between history of exposure to traumatic events and rates of change of each outcome?

3) Are there other individual characteristics (service dosage, age, gender, income) that account for these differences more or make the relationship with exposure to traumatic events disappear when included in the model?

It was hypothesized that children enrolled in the system of care would exhibit a decrease in internalizing and externalizing problem behaviors over time, but that this relationship would differ for those children with a history of exposure to traumatic events. More specifically, it was hypothesized that those children with a history of exposure to traumatic events would exhibit a higher baseline score and a slower rate of decline on internalizing and externalizing problem behaviors compared to children who do not have a history of trauma exposure. Similarly, it was hypothesized that the children would exhibit an increase in behavioral and emotional strengths, but that baseline scores would be lower and the rate of

increase in the strength index would be slower for children who have a history of exposure to traumatic events compared to those children who do not have such a history.

METHOD

The PARK Project

The Partnership for Kids (PARK) Project, funded from 2002 to 2008 by the Substance Abuse and Mental Health Services Administration's (SAMHSA) Center for Mental Health Services as part of the CMHS program, was an innovative approach to community-based service delivery through partnership with local schools, families, providers, and state agencies, for the purpose of producing positive outcomes for children and youth with serious emotional and behavioral challenges. PARK was the first community funded to start a system of care in the school system and expand services within the broader community rather than starting in the community and later going into the schools. In order to be eligible for enrollment in the PARK outcome study, a youth had to 1) attend one of the targeted schools; 2) have a an emotional, socio-emotional, behavioral, or mental disorder diagnosable under the *DSM-IV* or its *ICD-9-CM* equivalents, with the exception of *DSM-IV* V codes, substance use disorders, and developmental disorders; 3) require multi-agency service; 4) be at risk for or in out-of-home placement; and 5) exhibit impairment in the school, home and/or community that has lasted longer than 1 year. Families were referred to PARK through Student Assistance Teams at nine schools. Upon referral, a care coordinator met with the family to determine eligibility and collect intake information.

All families enrolled into the PARK system of care received an array of wraparound services individualized to the families' needs. These services were provided by community-based providers who were funded by the PARK Project and who had received training on system of care philosophy and the provision of services within a wraparound framework. As part of their involvement in PARK, the service providers were required to collect data documenting service provision at the youth and family level, including the dosage of services received. Funded services included: 1) care coordination – coordinators worked closely with families by providing service planning, crisis intervention, and access to entitlements and support services; 2) family advocacy – Family Partners (individuals who learned to negotiate the mental health service delivery system by advocating for their own children) provided various types of advocacy services depending on individualized needs; 3) therapeutic mentoring – positive adult role models who assist youth to find and nurture their strengths and enhance resilience; 4) psychiatric consultation –psychiatric evaluation, medication consultation, medication management, and therapeutic services; and 5) after school services – focused on recreational activities, homework assistances, and building youth skills and resilience.

Procedure

All families enrolled in the PARK Project were invited to participate in the outcome evaluation study. Families who agreed to participate in the outcome study participated in semi-structured interviews conducted by trained evaluation interviewers upon entry into the system of care and then every 6 months for up to 3 years. Both the parent or caregiver and the child (if older than 11 years) were

interviewed. Interviews lasted approximately 1 hour and 30 minutes per family

and the families received a $40 gift card for participation in each interview.

Participants

Of the families enrolled in the PARK Project, 64.9% (194 of 299 families)

consented to be in the outcome study. The families who elected to participate did

not differ from the families who did not participate on any key demographic

variables or trauma history. These 194 families were enrolled in the PARK

project for an average of 7.95 months (range = .5 to 27 months), and the data

reported in this paper was collected up to 18 months after initial enrollment. The

Human Investigations Committee at the Yale School of Medicine provided

oversight of this evaluation.

Measures

Several measures were included in this study including youth and family

demographics, child's history of exposure to traumatic events, total hours of

service use, and child outcomes. The demographic, history, and outcome

measures were required data elements in the ORC MACRO evaluation of the

CMHS program funded by the SAMHSA's Child and Family Branch (CMHS,

2005). Dosage of services was collected as part of the local evaluation by staff at

PARK-funded programs.

Youth and Family Demographic Characteristics. Caregivers provided

information on youth and family demographic characteristics using the

Enrollment Demographic and Information Form (EDIF; CMHS, 2005), which

was developed by ORC MACRO for the national evaluation. Demographic

characteristics included gender, age, race, and family poverty level as an indicator

of income. Poverty level (0 = at or above federal poverty level; 1 = below poverty level) was dummy coded. Race was not included in these analyses because the sample was overwhelmingly youth of color (94.3%).

Youth History of Exposure to Traumatic Events. At intake, caregivers provided histories of the youth and family on the Caregiver Information Questionnaire (CIQ; CMHS, 2005), which was developed by ORC MACRO for the outcome study. The caregivers indicated whether or not the child had a history of physical abuse, sexual abuse, or witnessing incidents of domestic violence. These three questions were combined to create a single dichotomous indicator of whether or not the youth had been exposed to a traumatic event prior to enrollment in the system of care (1 = history of exposure, 0 = no history of exposure).

Dosage of Total Services. Dosage information was documented by program staff from all PARK Project-funded services on an ongoing basis until a child exited the system of care. Services were logged by type and length (15-minute increments) and the data was sent to the evaluation team on a quarterly basis. The dosage variable used in this study is the sum total of dosage from across funded services: care coordination, family advocacy, therapeutic mentoring, psychiatric consultation, and after school services. Dosage data is not available for services that families received that were not funded by the PARK Project, and therefore the dosage variable represents the full dose of system of care funded services received by a child and his/her family. Substantial positive skewness was noted, but modeling with a square root transformation of the dosage did not substantively change the results; therefore, the untransformed

values were used.

Child Outcomes. Three measures of mental health outcomes were used: the Behavioral and Emotional Rating Scale - Second Edition, Parent Rating Scale (BERS-2C; Epstein & Sharma, 1998) Strength Index; and both the Internalizing and Externalizing subscales of the Child Behavior Checklist 6-18 (CBCL; Achenbach & Edelbrock 1983).

The BERS-2C assesses the emotional and behavioral strengths of children. Caregivers rate their child on 57 various behaviors and emotions on a four-point scale, with higher scores indicating greater emotional and behavioral strengths. The BERS-2C produces five subscale scores (Interpersonal Strength, Family Involvement, Intrapersonal Strength, School Functioning, and Affective Strength) and a Total Score Strength Index. The Strength Index was used for the present analyses. Scores range from below 70 to above 130, with scores below 70 indicating very poor strengths, scores from 70 to 79 indicating poor strengths, scores from 80 to 89 indicating below-average strengths, scores from 90 to 110 indicating average strengths, scores from 111 to 120 indicating above-average strengths, scores from 121 to 120 indicating superiors strengths, and scores above 130 indicating very superior strengths. Epstein and Sharma (1998) reported a coefficient alpha of .98 and test-retest reliability of .99 for the strength index. Reliability estimates above .80 and .90 have also been reported for samples of youth with emotional or behavioral disorders (Epstein, Harniss, Pearson, & Ryser, 1999).

The CBCL is a norm-referenced measure of problem behaviors providing standardized comparisons across children 6-18 years of age. Caregivers rate a

child's behavioral and emotional impairment by completing 113 items, which yield a total problem score and two broadband syndromes scales. The internalizing subscale is a measure of problem behaviors such as withdrawal, somatic complaints, anxiousness, and depression, while the externalizing subscale measures problem behavior such as delinquent and aggressive behavior. Raw scores are converted into standard T scores, with T values of 60 to 63 considered borderline clinical and scores above 63 in the clinical range. Adequate reliability and construct validity for the CBCL has been demonstrated (Achenbach, Dumenci, & Rescorla, 2002).

Data Analysis

Multilevel modeling (MLM), also called hierarchical linear modeling (HLM), was used to examine children's emotional and behavioral changes over time. Multilevel modeling has been increasingly used to assess individual change over time because it has some major advantages over other techniques, such as repeated measures ANOVA or MANOVA, in which all individuals must have an equal number of data points and the data collection must be time-structured (Holt, 2008). In this approach, each individual in the longitudinal design functions as his or her own "cluster" (O'Connell & McCoach, 2008). Multilevel models use an iterative method to estimate an individual growth trajectory that depends on a unique set of parameters for each participant at level 1. These random effects and the fixed effects of the independent variables are included in a regression equation to predict values for the dependent variables across time. Because the trajectories are specific to each participant, missing observations are estimable on the regression line plotted through the model parameter estimates (Ickovics et al.,

2006). At level 2, the individual growth parameters (i.e., the intercept and slope estimates) then become the outcome variables, in which child characteristics are included to explain the variability among children's growth trajectories. Therefore, multiple observations over time are nested within the individual (Raudensbush & Bryk, 2002; Singer & Willett, 2003). A major advantage of this modeling approach over other repeated measures approaches is that it permits use of all the data when individuals have some missing observations; also, the approach properly models the correlated observations within each child, unlike regular regression.

Multilevel models were used to examine the impact of a child's history of exposure to traumatic events (physical abuse, sexual abuse, or domestic violence) on the three outcomes over four time periods (baseline, 6, 12, and 18 months). The primary dependent variables were continuous scale scores from the CBCL and BERS-2C. Therefore, repeated observations of these outcome measures within each child were level-1 units and child characteristics (e.g., traumatic event exposure, gender) used to explain the growth trajectory were level-2 units. The primary independent variable (and level-2 unit) of interest in this study was history of traumatic events. However, additional level-2 variables that have influenced rates of change in systems of care in previous research, such as age (grand mean centered), gender, income, and dosage of service hours received, were included to examine if differential rates of change over time were due to these variables rather than history of traumatic events. Because the three outcomes – the BERS-2C Strength Index, the CBCL Internalizing Problem Behaviors Subscale score, and the CBCL Externalizing Problem Behaviors score

– measure different constructs, they were modeled separately. The multilevel models were computed with the HLM 6.02 software package (Raudensbush, Bryk, & Congdon, 2004), using Full Information Maximum Likelihood to manage missing data.

Consistent with recommendations of Singer and Willett (2003), a series of models were run to assess changes in the three outcomes over time:

Model A (Unconditional Growth Model) examined the proportion of variability in outcome measures (e.g., CBCL Internalizing scores) that exists between level-2 units (i.e., children) with time entered as a level-1 predictor. Variance components for the intercept and slope were included in the original model and examined for significance; in cases where variance components of the slope were non-significant these variance components were dropped from subsequent models.

Model B (Uncontrolled Effects of Traumatic Event History) examined the effect of history of exposure to traumatic events by adding this level-2 predictor to Model A for each of the three outcome variables.

Finally, Model C (Controlled Effects of Traumatic Event History) examined the controlled effects of traumatic event history on each of the outcomes by including age (grand mean centered), gender, family poverty level, and service dosage as level-2 predictor variables to Model B to assess whether differential rates of change over time as a function of history to traumatic events remain significant after controlling for these other variables.

Sample

Of the 194 youth in the outcome study, 134 (69%) of these children and

their families had complete level-2 data and were included in the sample. The children in the analysis sample were similar to those without complete level-2 data on age, race, poverty level, trauma history, and baseline scores on the BERS and CBCL. However, the children in the sample were significantly more likely to be male [t (191) = 2.05, $p < .05$] with a higher dosage of service [F (1,187) = 4.87, $p < .05$]. These variables were controlled for in subsequent analyses. The children in the sample also did not significantly differ from rest of the children in the PARK project (N = 299) on trauma history. The sample was 68% male and 32% female, with a mean age of 11.99 (Age Range = 5.22 - 19.10). Seventy-two percent of the families in the sample had an income below the federal poverty level. The majority of the caregivers were the child's biological parent (82%). Caregivers' report indicated that 38% of the children in the sample had a history of exposure to traumatic events, the majority of whom witnessed domestic violence (31%) and only a small percentage with histories of physical (8%) or sexual (5%) abuse. DSM-IV diagnoses were available for 119 of the children; the most common types of diagnoses were attention deficit/hyperactivity disorders (23.9%), adjustment disorders (17.9%), impulse control disorders (16.4%), and mood disorders (13.4%). Service dosages ranged from 3.00 to 421.08 hours with a mean of 105.71 (SD = 97.47). Sample characteristics are presented in Table 1.

<Table 1 here>

RESULTS

Behavioral and Emotional Strengths

Model A tested an unconditional growth model for behavioral and emotional strengths, in which time (i.e., the number of months since enrollment in

the system of care) was the only predictor. In the initial model, random effects estimates for the slope were non-significant, and a model conducted excluding the slope estimate provided a better fit for the data (X^2 (2) = 2.13, *ns*). The results of this model indicated that system participants had an average intercept (i.e., mean baseline BERS-2C score) of 85.63 (*p* < .001) and that scores significantly increased by 1.83 (*p* < .01) units every six months over the duration of the study. The variance component for the intercept was significant (*p* < .001), suggesting that there is significant variation in initial status. Results for Models A, B, and C with the BERS-2C strength index as the dependent variable are summarized in Table 2 with a non-randomly varying slope.

<center>**<Table 2 here>**</center>

Model B added the effect of traumatic event history as a predictor of change in BERS-2C scores. Again, the variance component for the slope was non-significant, and omission of this random effect led to a better fitting model (X^2 (2) = 1.31, *ns*). The results reveal that history of traumatic event exposure significantly predicted variability in the slope but not the intercept, suggesting that children with a traumatic event history did not differ at baseline, but that their rate of change (i.e., improvement in strengths) was significantly slower (γ = -2.67, *p* < .05) than children without a traumatic event history. The variance component for the intercept was significant (*p* < .001), suggesting that there continues to be unexplained variability.

Finally, Model C included other possible predictor variables: age (grand mean centered), gender, poverty level, and service dosage. As in the previous models, a better fit was achieved when the non-significant random effect for slope

was excluded from the model (X^2 (2) = 1.17, *ns*). After controlling for the other predictors, history of exposure to traumatic events continued to significantly predict variability in the slope but not the intercept, suggesting that children with a traumatic event history exhibited significantly slower rate of change (γ = -3.00, *p* < .05) than children without a traumatic event history. None of the other predictors significantly accounted for variability in the intercept or slope. The variance component for the intercept was significant (*p* < .001), suggesting that unexplained variability remains, and the pseudo R^2 statistics indicate that inclusion of the additional predictors only accounted for 2% of the within-person variability and 1% in the initial status (i.e., baseline).

Figure 1 displays the growth trajectories for children with a history of exposure to traumatic events compared to children without such a history in the best-fitting model (Model B). According to the goodness-of-fit statistics, the X^2 Model comparisons only slightly favor Model A over Model B and the Akaike information criterion (AIC) favors Model B. This suggests that including traumatic event history slightly improves the fit of the model and adding the additional predictors actually worsens the fit of the model.

<center>**<Fig. 1 here>**</center>

Internalizing Problem Behaviors

The results of Models A, B, and C for the CBCL internalizing scale with non-randomly varying slopes are presented in Table 3. As with the BERS-2C analyses, the models conducted excluding the slope estimate provided a better fit for the data. The unconditional growth model (Model A) revealed that children had an average intercept (i.e., mean baseline internalizing score) of 64.44 (*p* <

.001) and that this score significantly decreased by 1.93 ($p < .001$) units every six months over the duration of the study. The variance component for the intercept was significant ($p < .001$), suggesting that there is much variation in initial status.

<center>**<Table 3 here>**</center>

Model B, with traumatic event history as the only level-2 predictor, revealed an average intercept of 64.19 ($p < .001$) after controlling for traumatic event history and a significant decrease in this score by 2.29 ($p < .001$) units every six months over the duration of the study. History of exposure to traumatic events had a trend-level effect for predicting variability in the slope but not the intercept, suggesting that children with a traumatic event history did not differ at baseline, but that their rate of change (i.e., decrease in symptoms) was slower ($\gamma = 1.19$, $p = .07$) than children without a traumatic event history. The variance component for the intercept was significant ($p < .001$), suggesting that there continues to be unexplained variability.

Finally, Model C revealed that after controlling for all of the additional predictor variables, history of exposure to traumatic events continued to exhibit a trend-level effect for the slope but not the intercept, suggesting that children with a traumatic event history exhibited a slower rate of change ($\gamma = 1.13$, $p = .08$) than children without a traumatic event history. In addition, gender significantly predicted the slope ($\gamma = -1.62$, $p < .05$) but not the intercept, suggesting that boys and girls exhibited similar levels of internalizing symptoms at baseline, but that boys' symptoms decreased at a slower rate compared to girls. The variance component for the intercept was significant ($p < .001$), suggesting that unexplained variability remains, and the pseudo R^2 statistics indicate that

inclusion of the additional predictors only accounted for 1% of the within-person variability and 3% in the initial status.

Figure 2 displays the growth trajectories for boys and girls with a history of exposure to traumatic events compared to boys and girls without such a history in Model C. According to the goodness-of-fit statistics, the X^2 Model comparisons only slightly favor Model A over Model B and the AIC favors Model A. This suggests that including traumatic event history and the additional predictors worsens the fit of the model.

<Fig. 2 here>

Externalizing Problem Behaviors

The results of Models A, B, and C for the CBCL externalizing scale with non-randomly varying slopes are presented in Table 4. As with the previous outcomes, the models conducted excluding the slope estimate were a better fit for the data. The unconditional growth model (Model A) revealed that children had an average intercept (i.e., mean baseline externalizing score) of 66.85 ($p < .001$) and that this score significantly decreased by 1.66 ($p < .001$) units every six months over the 18 months in the system of care. The variance component for the intercept was significant ($p < .001$), suggesting that there is much variation in initial status.

<Table 4 here>

In contrast to the Model B for internalizing behaviors, for externalizing behaviors, history of exposure to traumatic events had a trend-level effect for predicting variability in the intercept but not the slope, suggesting that children with a traumatic event history exhibited a trend toward higher scores at baseline

($\gamma = 3.09$, $p = .09$) but that their rate of change (i.e., decrease in symptoms) was the same as children without a traumatic event history. The variance component for the intercept was significant ($p < .001$), suggesting that there continues to be unexplained variability.

Finally, Model C found that, after controlling for all of the additional predictor variables, history of exposure to traumatic events continued to exhibit a trend-level effect for the intercept ($\gamma = 3.30$, $p = .07$). Additionally, gender also had a trend-level effect for the intercept ($\gamma = -3.19$, $p = .08$), suggesting that boys exhibited a trend of more externalizing behaviors at baseline but that these symptoms decreased at the same rate as the symptoms for girls. The variance component for the intercept was significant ($p < .001$), signifying that unexplained variability remains, and the pseudo R^2 statistics indicate that inclusion of the additional predictors only accounted for 5% of the within-person variability and 2% in the initial status.

Figure 3 displays the growth trajectories for children with a history of exposure to traumatic events, compared to children without such a history in Model B. According to the goodness-of-fit statistics, the X^2 Model comparisons only slightly favor Model A over Model B and the AIC is roughly equivalent for Models A and B. This suggests that including traumatic events history does not worsen the model fit but that inclusion of the additional predictors does worsen the fit of the model.

<Fig. 3 here>

DISCUSSION

Systems of care were designed to increase access to, and coordination of,

services in order to improve the clinical functioning of children with severe emotional and behavioral disorders. The purpose of this study was to examine how a history of exposure to traumatic events (i.e., physical abuse, sexual abuse, family violence) impacted children's functioning over time in a system of care. Using normed clinical measures, the findings support the positive clinical trajectories of children with severe emotional and behavioral disorders during enrollment in a school-based system of care and imply that a history of exposure to traumatic events may be negatively related to these trajectories.

The results of the multilevel growth models indicate that children receiving services through the PARK Project exhibited increased emotional and behavior strengths and decreased internalizing and externalizing problem behaviors during enrollment and at 18 months follow-up. The results also suggest that those children with a history of exposure to traumatic events improved more slowly than children without a traumatic events history on both strengths and internalizing problem behaviors, even after controlling for dosage of services received and other characteristics previously found to predict outcomes (e.g., age, gender). Additionally, gender was also related to improvement in internalizing symptoms. These results partially support our hypotheses. It should be noted, however, that model fit indices signify that adding traumatic events history slightly improved fit, but adding additional parameters worsened the fit for all of the models. Because the models tested accounted for a small percentage of within-person and baseline variance, the results suggest that there may be other characteristics that were not included in the models that may account for additional variance.

Although the clinical levels of problem behaviors and below average strengths are not startling in a sample of children with severe emotional and behavioral disorders, the results of the multilevel models suggest that children in the PARK Project improved over time on the CBCL and BERS-2C. These results are consistent with previous studies reporting improvements for children in systems of care (Anderson et al., 2008; Graves, 2005; Kaufman et al., 2008). For children with a history of exposure to traumatic events, results support the findings of Walrath and her colleagues (2006), who found that children with a trauma history (physical or sexual abuse only) had higher levels of problem behaviors at baseline and at 6-month follow-up. However, unlike Walrath and colleagues (2006), the results of the present study suggest that the rates of improvement on the BERS-2C Strength Index, as well as the CBCL Internalizing scale, were slower for children who have a history of exposure to traumatic events and that these differential rates were present 18 months after initial enrollment in the system of care. Since previous studies have shown that children with trauma histories receive more services than children without trauma histories (Leslie, Hurlburt, Landsverk, Barth, & Slymen, 2004; Walrath et al., 2006), it is important to note that in this study these differences in improvements continued to be present even after controlling for dosage of services received in the system of care.

The present study compounds the need to assess the impact of trauma and exposure to potentially traumatic events for children served in a system of care. Specifically, researchers, evaluators, and administrators must examine trauma experienced by the children and families in systems of care and how to more

effectively serve children with trauma histories. A deeper examination of trauma should include a focus on both identification and treatment. Identification of trauma exposure, moderators of trauma, and trauma-related outcomes would be accomplished through inclusion of trauma-focused assessments and measures from multiple sources. These assessment tools need to include a broadened definition of trauma (e.g., exposure to community violence, removal from home, parental incarceration, emotional abuse) and obtain more details to truly understand how trauma is experienced by and influences children and families. Trauma-informed treatment and services are also an essential component and should be sensitive to, and informed by, trauma-related issues. Such services may include evidence-based practices, such as trauma focused-cognitive behavioral therapy (de Arellano, Ko, Danielson, & Sprague, 2008), and non-traditional approaches like Art Therapy (Eaton, Doherty, & Widrick, 2007).

Several initiatives have already begun to raise awareness about and establish trauma-informed models for systems of care. For example, The Thrive Initiative, funded by SAMHSA and the state of Maine, is the first system of care for children, youth, and families that is trauma-informed at every level. Thrive staff provide technical assistance and training on trauma-specific evidence-based practices and trauma-informed theory, and they have created an assessment tool for trauma-informed systems of care ("Thrive Initiative," 2008). San Diego's Raising the Bar is an initiative that focuses on domestic violence and has proposed a system-of-care continuum that represents services and activities aimed at preventing domestic violence and supporting children who have been exposed to it (Cohen, Blevins, Dicke, & Gish, 2008). These initiatives offer examples of

how other systems of care and organizations can also increase their capacity to effectively address trauma.

Government agencies have also recognized the need for a focus on trauma in systems for children and families. The National Child Traumatic Stress Network's (NCTSN) Service Systems Program is focused on creating trauma-informed child-serving systems, with the goal of providing ready access to effective trauma services and interventions as soon as children enter systems. Their vision includes increasing awareness and knowledge among public, staff, and community and national partners, as well as training clinicians and practitioners in effective trauma assessment strategies and interventions (Ko & Sprague, 2007). Additionally, The Centers for Disease Control have initiated a program focused on building community readiness around the prevention of child maltreatment by promoting effective, evidence-based strategies and policies (CDC, 2008). Finally, SAMHSA has also brought attention to children's trauma histories in systems of care and the need for early identification and appropriate treatments (Macro International Inc, 2007). Unfortunately, the proposed outcome evaluation instruments for recently funded (Phase VI) SAMHSA system of care communities does not include a comprehensive assessment of exposure to traumatic events (Macro International, Inc., personal communication, August 7, 2009).

Limitations

There are some limitations which need to be considered. First, the measure of history of exposure to traumatic events used in this paper is a dichotomous indicator of trauma, which addresses a history of exposure to three potential types

of traumatic events (physical abuse, sexual abuse, and domestic violence). This definition is not inclusive of all potential types of trauma exposure and therefore may affect whether or not the results are generalizable. Additionally, the information was based on caregiver report and was not corroborated by the youth or formal records, and it is possible that some caregivers were not aware of or willing to endorse a trauma history. There is a potential for bias in that some youth who were exposed to trauma may have been incorrectly classified as not exposed because trauma was not reported by their caregivers. Therefore, the measure used in the study should be described as an indicator of youth whose caregivers were willing to endorse, or were aware of, past trauma. The inclusion of multiple sources of information (e.g., youth, other family members, clinicians, mandated reporting records) would have provided more comprehensive data and may have yielded different results.

A potential and related concern is the low percentage of children in the sample whose caregivers reported a history of trauma (37.8%). The overall percentage reported in the present study is similar to the percentage reported by Walrath and colleagues (36.5%), who also used a caregiver-reported measure in the national system-of-care dataset. However, reported trauma histories for the youth in the present study were largely comprised of exposure to domestic violence (30.6%; see Table 1). The percentages of youth in this study with physical abuse histories (7.5%) and sexual abuse histories (4.5%) were markedly lower than those reported by Walrath and her colleagues, suggesting that trauma histories may be under-reported for the present sample. Therefore, the present sample of children with trauma histories is primarily focused on children who

have witnessed domestic violence. It is also important to note that there are additional types of exposure to traumatic events that were not included in these studies, but that research has demonstrated youth experience such as exposure to community violence or physical assault (Finkelhor et al., 2009). Future studies should include more comprehensive assessments of the multiple types of traumatic events that youth may be exposed to.

Another limitation of the study was the lack of a comparison group of youth receiving services outside of a system of care. As a result, we cannot determine if the results are specific for youth in systems of care or if they apply more generally to youth receiving any services or treatment. The sample size was also small due to the substantial decrease in youth who had the complete level-2 data (134 out of 194) required for the analyses. Therefore, it is important to note that the generalizability of the sample may be limited. Additionally, because several of the findings in the present study were trends and were not statistically significant, future studies need to replicate these findings with a larger sample to ascertain if the findings are more robust.

Conclusion

The results of the present study suggest that a history of exposure to physical abuse, sexual abuse, or domestic violence may be negatively related to the rates of improvement for children enrolled in a system of care. Further research is needed on moderators of and the mechanisms through which trauma may impact children and families served in systems of care in order to bridge the outcome gaps for these children. Once the effects are more clearly understood, agencies will be better able to develop and identify appropriate and targeted

interventions. Systems of care can then strive to increase access to these interventions and implement comprehensive training programs for clinicians and administrators, such as the trainings through the NCTSN and SAMHSA. Making these goals a priority will move all systems of care to a more trauma-informed and inclusive framework that increases the capacity to meet the needs of the numerous children and families who have been exposed to trauma.

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Table 1. Demographic characteristics of the sample (N = 134)

	n	Percentage
Gender		
Male	91	68
Female	43	32
Race / Ethnicity		
Hispanic / Latino	83	61.9
Black / African American	40	29.9
Multiracial	3	2.2
White	2	1.5
Asian	1	0.7
Missing	5	3.7
Poverty Level		
At or above poverty level	38	28
Below poverty level	96	72
Caregiver's Relationship to Child		
Biological parent	110	82.1
Adoptive / stepparent	4	3.0
Foster parent	2	1.5
Sibling	1	0.7
Aunt or Uncle	5	3.7
Grandparent	11	8.2
Legal guardian	1	0.7
Positive History of Trauma (caregiver reported)		
Physical abuse	10	7.5
Sexual abuse	6	4.5
Domestic violence	41	30.6
TOTAL	44	37.8

	n - children who received the service	Dosage: mean hours of service (*range of hours*)
Service Dosage		
Care Coordination	133	50.6 (*3-204*)
Family Advocacy	78	19.8 (*1-93*)
Therapeutic Mentoring	48	64.4 (*1-213*)
Psychiatric Consultation	47	13.8 (*1-90*)
After School Services	21	102.2 (*13-239*)
TOTAL dosage	134	105.7 (*3-421*)

Note. Race / ethnicity is a combined variable including child's race and whether or not the child is of Hispanic origin, as reported by the caregiver.
Average length of stay in services was 7.95 months.

Table 2. Results of fitting a taxonomy of multilevel models for change in behavioral and emotional strengths (BERS-2C strength index) without random slopes (N = 134).

	Parameter	Model A		Model B		Model C	
Fixed Effects							
Initial Status		Estimate	SE	Estimate	SE	Estimate	SE
	Intercept	85.63***	1.59	85.54***	1.93	84.23***	3.37
	Trauma History			0.23	3.36	0.38	3.36
	Age (GMC)					0.22	0.47
	Gender					-3.53	3.51
	Poverty Level					3.09	3.55
	Service Dosage					0.00	0.02
Slope							
Rate of Change							
	Slope Intercept	1.83**	0.59	2.68***	0.71	3.32*	1.31
	Trauma History			-2.67*	1.26	-3.00*	1.27
	Age (GMC)					-0.21	0.17
	Gender					-0.07	1.33
	Poverty Level					-1.46	1.41
	Service Dosage					0.00	0.01
Variance Components							
Random Effects		Estimate	SD	Estimate	SD	Estimate	SD
	Intercept	218.01***	14.77	215.81***	14.69	210.45***	14.51
	Slope	--	--	--	--	--	--
	Within-person	135.19	11.63	133.04	11.53	131.95	11.49
Pseudo R² Statistics and							
Goodness-of-fit		Statistic		Statistic		Statistic	
	R^2_ε	--		0.02		0.01	
	R^2_o	--		0.01		0.02	
	Deviance	3040.28	4 parameters	3035.03	6 parameters	3030.27	14 parameters
	X² Comparison	--		5.24 (df = 2)	p = .07	4.76 (df = 8)	p = >.500
	AIC	3048.28		3047.03		3058.27	

Note. *p < .05, **p < .01, ***p < .001, °trend-level effect. Age is grand mean centered.

Table 3. Results of fitting a taxonomy of multilevel models for change in internalizing problem behaviors (CBCL internalizing subscale) without random slopes (N = 134).

	Parameter	**Model A**		**Model B**		**Model C**	
Fixed Effects							
Initial Status		Estimate	SE	Estimate	SE	Estimate	SE
	Intercept	64.44***	0.86	64.19***	1.04	63.73***	1.87
	Trauma History			0.78	1.84	0.86	1.83
	Age (GMC)					-0.12	0.25
	Gender					2.03	1.86
	Poverty Level					1.06	1.94
	Service Dosage					-0.01	0.01
Slope							
Rate of Change							
	Slope Intercept	-1.93***	0.30	-2.29***	0.36	-1.73*	0.67
	Trauma History			1.19°	0.64	1.13°	0.64
	Age (GMC)					0.13	0.08
	Gender					-1.62*	0.65
	Poverty Level					-0.33	0.71
	Service Dosage					0.00	0.00
Variance Components							
Random Effects		Estimate	SD	Estimate	SD	Estimate	SD
	Intercept	68.15***	8.26	67.12***	8.19	66.55***	8.16
	Slope	--	--	--	--	--	--
	Within-person	37.06	6.09	36.61	6.05	35.42	5.95
Pseudo R^2 Statistics and							
Goodness-of-fit		Statistic		Statistic		Statistic	
	R^2_ε	--		0.01		0.03	
	R^2_o	--		0.02		0.01	
	Deviance	2692.06	4 parameters	2687.13	6 parameters	2677.19	14 parameters
	X^2 Comparison	--		4.93 (df = 2)	p = .08	9.94 (df = 8)	p = .27
	AIC	2670.06		2699.13		2705.19	

Note. *$p < .05$, **$p < .01$, ***$p < .001$, °trend-level effect. Age is grand mean centered.

Table 4. Results of fitting a taxonomy of multilevel models for change in externalizing problem behaviors (CBCL externalizing subscale) without random slopes (N = 134).

Parameter	Model A		Model B		Model C	
Fixed Effects						
Initial Status	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	66.85***	0.86	65.85***	1.03	65.65***	1.83
Trauma History			3.09°	1.81	3.30°	1.79
Age (GMC)					-0.07	0.25
Gender					-3.19°	1.81
Poverty Level					1.97	1.89
Service Dosage					-0.00	0.01
Slope						
Rate of Change						
Slope Intercept	-1.66***	0.30	-1.71***	0.35	-0.80	0.67
Trauma History			0.18	0.64	0.05	0.65
Age (GMC)					0.01	0.08
Gender					-0.75	0.66
Poverty Level					-0.85	0.71
Service Dosage					0.00	0.00
Variance Components						
Random Effects	Estimate	SD	Estimate	SD	Estimate	SD
Intercept	67.50***	8.22	64.78***	8.05	61.76***	7.86
Slope	--	--	--	--	--	--
Within-person	36.30	6.03	36.38	6.03	35.80	5.98
Pseudo R^2 Statistics and						
Goodness-of-fit	Statistic		Statistic		Statistic	
R^2_ε	--		-0.002		0.02	
R^2_o	--		0.04		0.05	
Deviance	2685.42	4 parameters	2681.51	6 parameters	2672.02	14 parameters
X^2 **Comparison**	--		3.92 (df = 2)	p = .14	9.48 (df = 8)	p = .30
AIC	2693.42		2693.51		2700.02	

Note. *$p < .05$, **$p < .01$, ***$p < .001$, °trend-level effect. Age is grand mean centered.

Figure 1. Longitudinal Changes in BERS-2C Strength Index Scores by Traumatic Event History.
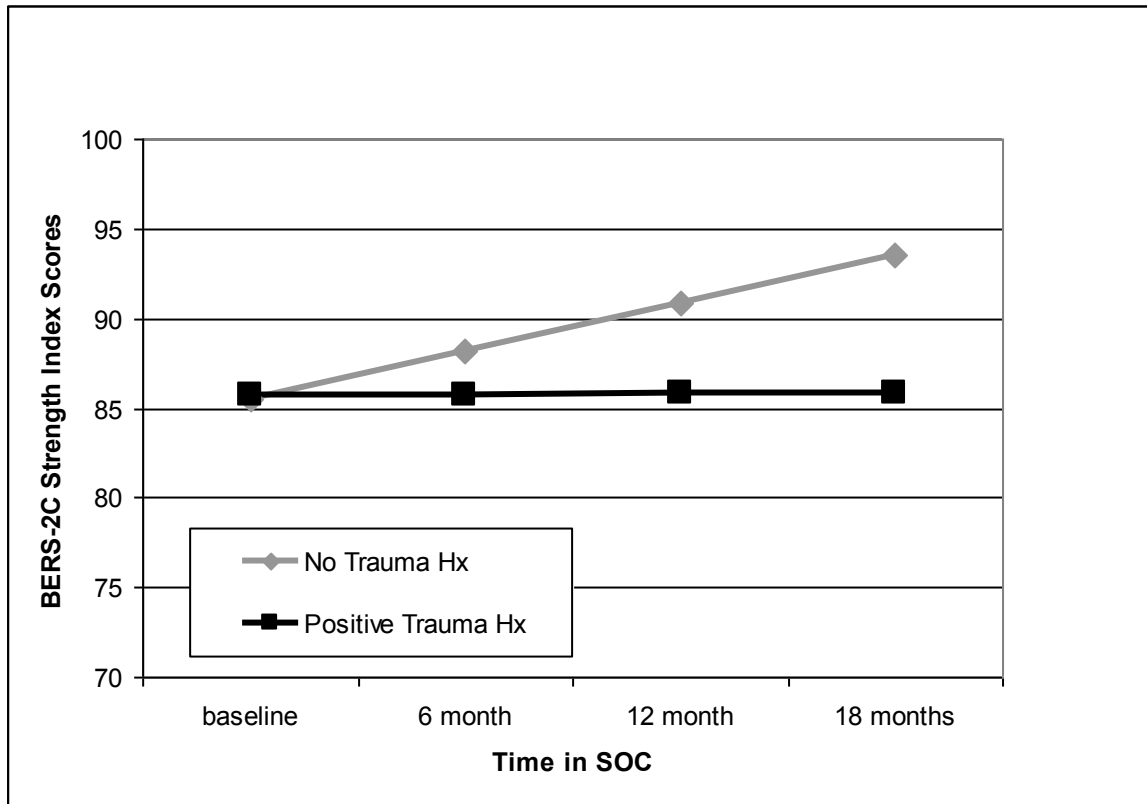
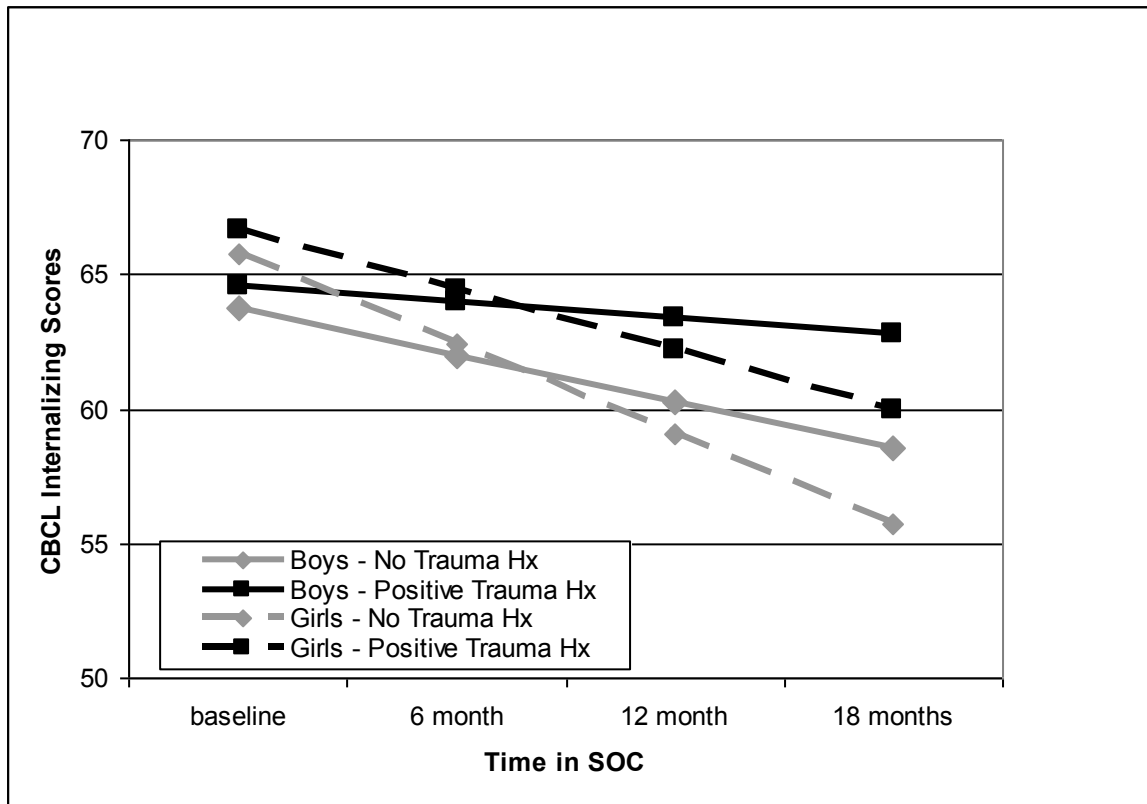*Figure 2.* Longitudinal Changes in CBCL Internalizing Scores by Traumatic Event History and Gender.

Figure 3. Longitudinal Changes in CBCL Externalizing Scores by Traumatic Event History.