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**CHILD MALTREATMENT AND ADOLESCENT EXTERNALIZING BEHAVIOR:
THE POTENTIAL MEDIATING ROLE OF PEERS**

A Thesis in
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by
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ABSTRACT

The present study examined the association between peer relationships and externalizing behavior in a sample of high-risk youth during the transition to adolescence. The present sample included youth and their caregivers who participated in a multisite prospective study of youth at risk for maltreatment. Data regarding peer relationships and externalizing behavior were assessed at ages 12, 14, and 16. Maltreatment data were abstracted and coded from official records. A cross-lagged panel mediation model evaluated whether or not peer relationships at age 14 mediated the association between child maltreatment (i.e. prior to age 12) and subsequent externalizing behavior at age 16. Although a mediational model was not supported, individual pathways revealed significant relationships between maltreatment, peer relationships, and externalizing behavior during the transition to adolescence. Findings suggest that recent, ongoing maltreatment is a risk factor for later problem behavior, and that youth involved with negative peers are at risk for subsequent victimization. Intervention opportunities and future directions are discussed.

Keywords: child maltreatment, peer relationships, externalizing behavior, LONGSCAN

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Introduction

There were over 700,000 confirmed instances of child maltreatment in the U.S. during 2015, the latest year in which official statistics are available (U.S. Department of Health & Human Services, 2017). Child maltreatment refers to “any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act, which presents an imminent risk of serious harm” (U.S. Department of Health & Human Services, 2017, p. viii). Such trauma can result in significant and long-lasting psychological and behavioral problems (Gilbert et al., 2009; Trickett, Negriff, Ji & Peckins, 2011). Adolescents with a history of child maltreatment exhibit a greater risk for delinquent behaviors, including aggression (Bolger & Patterson, 2001; Rogosch & Cicchetti, 1994), substance use (Moran, Vuchinich, & Hall, 2004; Rogosch, Oshri & Cichetti, 2010), and violence (Duke, Pettingell, McMorris, & Borowsky, 2010; Smith & Thornberry, 1995). Delinquent behavior typically refers to illegal behavior conducted by a minor, including but not limited to violence against others, property crimes, and vandalism (Lipsey & Derzon, 1998; Yoshikawa, 1995). Although some forms of adolescent delinquency are developmentally normative (Lipsey & Derzon, 1998; Moffitt, 1993), maltreated youth are significantly more likely than their non-maltreated counterparts to be arrested for violent crimes both as juveniles and as adults (Gilbert et al., 2009; Lansford et al., 2007; Lee, Herrenkohl, Jung, Skinner, & Kilka, 2015), and exhibit aggressive behavior earlier in the life course (Moffitt & Caspi, 2001; Villodas et al., 2015). In fact, youth with a history of child maltreatment are 2.0-4.8 times more likely to be arrested as juveniles and as adults, respectively, compared to their non-maltreated counterparts (English, Widom & Brandford, 2002; Smith & Thornberry, 1995). This delinquent behavior is likely to be more violent (Herrenkohl, Huag, Tajima & Whitney, 2003; Salzinger,

Rosario & Feldman, 2007), including homicide, rape, robbery, burglary, kidnapping criminal mistreatment, stalking, and harassment (Widom & Maxfield, 1996). Given that early delinquent behavior is the primary predictor of continuous delinquency (Lipsey & Derzon, 1998; Moffitt, 1993), this research suggests that youth with a history of child maltreatment experience a different etiological trajectory whereby child maltreatment predicts early-appearing, continuous maladaptive delinquent trajectories (Jones et al., 2013; Thompson et al., 2010; Villodas et al., 2015). Notably, although this trajectory of violence is often studied among males and those with a history of physical abuse (Lansford et al., 2007; Perkins & Jones, 2004), significant associations have been established across sex and other demographic characteristics (English et al., 2002; Gilbert et al., 2009; Moffitt & Caspi, 2001) as well as other maltreatment subtypes, including neglect (Kotch et al., 2008; Widom & Maxfield, 1996), sexual abuse (Jones et al., 2013), emotional abuse (Lee et al., 2015), and combinations of maltreatment subtypes (Duke et al., 2010; Herrenkohl & Herrenkohl, 2007; Moran et al., 2004).

However, not all maltreated children participate in delinquent behaviors, suggesting engagement of developmentally salient risk mechanisms for some and not for others. In other words, processes critical to adolescent development may inhibit or exacerbate delinquent behavior. From a developmental psychopathology framework (Cicchetti & Toth, 1995; Sroufe & Rutter, 1984), it is necessary to identify the salient mechanisms that promote or deter delinquency among adolescents with a history of child maltreatment so that delinquency prevention efforts are better informed (Luthar, Cicchetti & Becker, 2000). By assessing behavior within a developmental context, developmental psychopathologists aim to identify the causes and course of deviations from normative developmental trajectories. Prior research supporting this perspective notes that child maltreatment interferes with developmentally salient tasks that

alter normative trajectories and increase the risk for engagement in externalizing behaviors (Graham et al., 2010), a precursor of subsequent delinquency in adolescence (Liu, 2004). One such developmental task is formation of, and engagement in prosocial peer relationships (Sroufe & Rutter, 1984).

Extensive research has demonstrated the role that peer relationships play in elicitation of and engagement in externalizing behaviors and delinquency throughout adolescence (Dishion & Tipsord, 2001; Henry, Tolan, & Gorman-Smith 2001; Samek, Goodman, Erath, McGue, & Iacono, 2016). Children who have been maltreated, in particular, have greater difficulty in establishing prosocial relationships, which can have subsequent effects on externalizing behaviors and delinquency. For instance, children who have been maltreated are more likely to be viewed as aggressive or unpopular and to experience rejection by their same-aged, prosocial peers (Bolger & Patterson, 2001; Kim & Cicchetti, 2010). Peer rejection, in turn, can result in ineffective social interactions (Bolger, Patterson & Kupersmidt, 1998; Rogosch & Cicchetti, 1994) and increases involvement with antisocial peers (Laird, Jordan, Dodge, Pettit, & Bates 2001). This association subsequently increases individual engagement in externalizing behaviors (Kim & Cicchetti, 2010) and delinquent acts (Liu, 2004; Topitzes, Merskey, Dezen, & Reynolds, 2013) through the reinforcement of violent attitudes and maladaptive behaviors that can extend throughout adolescence and into adulthood (Herrenkohl et al., 2003; Snyder, Dishion, & Patterson, 1986). Indeed, maladaptive behavioral trajectories seemingly increase over time for maltreated samples (Godinet, Li, & Berg, 2014; Thompson et al., 2011), in part due to peer relationships (Dubowitz et al., 2016; Graham et al., 2010), whereas normative populations typically return to adaptive functioning after brief periods of typical dysfunction in adolescence

(Moffitt & Caspi, 2001). Thus, the quality of peer relationships in adolescence subsequent to child maltreatment may serve as a mechanism leading to increased risk for delinquent activity.

Although peers are recognized as a risk mechanism, they have the potential to be protective for those children who have experienced maltreatment. Kim and Cicchetti (2010), found that maltreatment predicted emotional regulation, which reduced subsequent internalizing behavior by way of peer acceptance. Similarly, Pepin and Banyard (2006) found that peer support mediated the association between child maltreatment and developmental outcomes. These results suggest that peer relationships may also function as a critical resilience mechanism for high-risk adolescents. Given that peer relationships are not a static construct, and they differentially impact the likelihood of delinquency depending on the context, peers serve as an optimal target for intervention. By capitalizing on exposure to prosocial peers and limiting self-selection into delinquent peer groups, maltreated youth may be able to ameliorate the negative impact of their maltreatment experience and alter a potentially maladaptive trajectory.

Although prior studies have examined the relation between child maltreatment, peer relationships, and delinquent behavior, no study has comprehensively tested the direct causal relation among these variables in a methodologically rigorous way to identify whether peer relationships serve as a mechanism of delinquency among adolescents with a child maltreatment history more so than non-maltreated samples. The present study addresses these gaps by investigating peer relationships as a causal mechanism explaining the relation between child maltreatment and subsequent delinquency in a large-scale, comprehensive dataset. Data collected from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN; Runyan et al., 1998) will be used to investigate peer relationships as a mechanism explaining the relation between child maltreatment and subsequent delinquency. LONGSCAN ($N = 1,354$) is a consortium of

five research sites aimed at investigating the etiology and consequences of child maltreatment. Because LONGSCAN is the only multi-site and multi-wave prospective cohort study of children at risk for maltreatment and its consequences, it provides the best opportunity to investigate the mechanistic role of peer relationships at the population level.

The present study aims to expand upon existing findings by further elucidating the association between peer relationships and behavioral outcomes in adolescents within the LONGSCAN sample. As such, the current study adopted two primary aims to advance research in the area of peer relationships among adolescents with a history of maltreatment: 1) to determine whether child maltreatment predicts externalizing behavior in mid- to late adolescence, and 2) to assess whether peer relationships subsequent to child maltreatment explain this relation. Child maltreatment status was determined by official Child Protective Services (CPS) records reviewed biennially from ages 0-18. LONGSCAN families also completed measures of peer relationships and externalizing symptoms at ages 12, 14, and 16. This age range was selected due to the developmental salience of peers during this transitional period, and the increased risk for engagement in externalizing behavior during the transition to adolescence (Cicchetti & Toth, 1995; Sroufe & Rutter, 1984). For purposes of the present analysis, we investigated the relations between a history of child maltreatment (i.e. prior to age 12), adolescent peer relationships at age 14, and externalizing behavior at age 16.

Method

Sample

All children in LONGSCAN were enrolled at or before age four, and were followed prospectively, at two-year intervals, from age four to eighteen. Youth across the five sites were

differentially recruited based on maltreatment risk. Three sites identified families from CPS records. The Southwest (SW) site recruited children who had already experienced maltreatment and were placed in out-of-home-care. A subset of these children returned home following recruitment. The Northwest (NW) sample recruited children deemed of moderate or high risk based on CPS assessment procedures, approximately half of whom had a substantiated report. The Midwestern (MW) site included three subgroups: two that were identified through CPS records and a third subgroup that consisted of matched controls. The Eastern site (EA) recruited children from a pediatric clinic at risk for maltreatment due to: 1) failure to thrive, 2) maternal drug use, or 3) low income. The Southern site (SO) also included children at high risk due to medical and/or sociodemographic factors, some of whom were reported to CPS (Runyan et al., 1998).

For all children enrolled in LONGSCAN ($N = 1,354$), child gender was approximately evenly split (female: 51.5%), and just over half the overall sample was African American (53.2%), followed by European American (26.1%), Mixed Race (11.9%), Hispanic (7.2%), Native American (0.6%), other (0.6%), and Asian (0.3%). In the parental demographic data available for the age 12 assessment ($n = 951$), the majority of mothers were unmarried (61.7%), and the median annual household income was \$20,000-\$24,999. Table 1 summarizes demographic information at age 12 for the total sample, and the maltreated versus non-maltreated samples.

Procedure

Following enrollment, LONGSCAN investigators conducted face-to-face interviews with multiple informants, including the primary caregiver and child, at regularly scheduled intervals (ages 4, 6, 8, 10, 12, 14, 16, and 18). Investigators administered extensive measures of

individual, familial, and community-level risk and protective factors, as well as subsequent exposure to maltreatment and adverse experiences to assess causal processes over time in a rigorous, methodologically sound manner. The prospective longitudinal design and repeated measures across evenly spaced biennial assessments and geographic regions enhance the validity of conclusions regarding directionality of causal processes and generalizability (Selig & Preacher, 2009). Annual telephone interviews were conducted between assessment periods to maintain retention and to track service utilization and major life events. Families received a fixed, nominal amount for their participation. Beginning at the age 12 assessment, investigators used the Audio-Computer Assisted Self-Interview (A-CASI) computer software to aid in uniform data collection and to ensure confidentiality. Measures manuals and data dictionaries for each interview protocol were developed and standardized across sites. All interviewers were trained in the standardized data collection protocol at the Coordinating Center. Institutional review boards at each site and at the Coordinating Center approved LONGSCAN protocols. The present analysis utilizes the publicly available age 4-18 dataset.

Measures

Maltreatment. LONGSCAN investigators assessed maltreatment status biennially by reviewing case records of confirmed child maltreatment obtained from CPS. Case records were reviewed and coded using a modified version of the Maltreatment Classification System (MMCS), originally published by developed by Barnett, Manly, & Cicchetti (1993). The MMCS (English & Investigators, 1997) classifies maltreatment on the basis of subtype, severity, frequency, timing, and perpetrator, providing a more comprehensive evaluation of the incident, particularly with respect to more nuanced definitions of neglect and emotional abuse (English, Bangdiwala, & Runyan, 2005). Importantly, the MMCS significantly improves detection of child

maltreatment over CPS records alone (Runyan et al., 2005). Researchers were trained to attain 90% interrater reliability with the MMCS protocol. Based on this systematic review of CPS records, investigators created dichotomous indicator variables for abuse substantiations within each two-year assessment period. A count of these variables prior to age 12 establishes maltreated ($N = 692$) and non-maltreated comparison groups ($N = 662$). Table 2 presents the frequency of maltreatment prior to age 12, between ages 12 and 14, and between ages 14 and 16. Maltreatment status at ages 12, 14, and 16 were included in the model, whereby maltreatment status at age 12 refers to substantiations prior to age 12, maltreatment status at age 14 refers to substantiations since age 12, and maltreatment status at age 16 refers to substantiations since age 14.

Contamination. Contamination, or unidentified exposure to child maltreatment in the control group, attenuates risk estimates and limits methodological conclusions in prospective longitudinal designs (Everson et al., 2008; Shenk, Noll, Peugh, Griffin, & Bensman, 2015). As such, a contamination variable was calculated as a statistical control for those individuals who self-reported incidents of child maltreatment but did not have a CPS substantiation.

LONGSCAN youth began to self-report maltreatment histories beginning at age 12. Participants completed the LONGSCAN Self-Report of Physical, Sexual and Psychological Abuse (SPSPA; Knight et al., 2000) at ages 12 and 16 to assess lifetime histories of exposure to physical abuse, sexual abuse, and psychological abuse. The age 12 assessment measured prior lifetime exposure to maltreatment through 15 items assessing physical abuse, 11 items assessing sexual abuse, and 18 items assessing psychological abuse. At age 16, these items were modified, resulting in 12 items assessing physical abuse, 11 items assessing sexual abuse, and 12 items assessing

psychological abuse since age 12. Internal consistencies for the SPSPA ranged from Cronbach's $\alpha = 0.66 - 0.91$.

The About My Parents (AMP; LONGSCAN Investigators, 1998) is a 25-item self-report measure of neglect based on the Multidimensional Neglectful Behavior Scale (Straus, Kinard, & Williams, 1995). The AMP measures physical neglect, emotional neglect, supervisory neglect, and educational neglect. However, four items measuring educational neglect and two items measuring supervisory neglect were dropped from the present study due to unreliability when subjected to confirmatory factor analysis (Dubowitz et al., 2011). The AMP was administered at the age 12 assessment, measuring neglect in elementary school and in the past year, and again at the age 14 and 16 assessments to measure neglect in the past year.

Based on these reports, a dichotomous indicator was created to note the occurrence of any type of self-reported maltreatment (i.e. physical, sexual, emotional, or neglect) in the control condition. Over one-half (53.2%) of the non-maltreated comparison participants self-reported one or more experience of child maltreatment prior to the age of 16. Both concurrent contamination and contamination over time was estimated.

Peer Relationships: Peer relationships were measured with the Risk Behaviors of Family and Friends (RBFA) survey, a LONGSCAN-developed measure that assesses the extent that peers engage in in positive and negative activities (e.g. attending church, drug use). Participants rated how many of their close friends (none, some, most) use tobacco, alcohol, and drugs, and engage in risk behaviors such as shoplifting, setting fires, fighting, damaging property, or carrying weapons. A total negative peer subscale was calculated by summing these items; items with a higher score represent more delinquent peer relationships. Mean negative peer relationships was 1.22 ($SD = 2.33$) at age 12, 2.65 ($SD = 3.21$) at age 14, and 4.46 ($SD =$

3.89) at age 16. Cronbach's alpha ranged from 0.83-0.85 across age 12-16 assessments. Table 3 displays the descriptive statistics for peer relationships across maltreated and control conditions.

Externalizing Behaviors: Externalizing behaviors, a broad category of child and adolescent acts serving as known precursors to delinquency, were tracked through caregiver reports on the Child Behavior Checklist (CBCL; Achenbach, 1991). The primary caregiver rated their child on each behavior (e.g. "cruelty to others," "vandalism," "gets into fights") on a three-point Likert scale (not true, somewhat true, very true/often true). Raw scores were converted into age-standardized *T*-scores with a mean of 50 and a standard deviation of 10. Reliability coefficients for the present sample indicated strong reliability, with alphas ranging from 0.92-0.94 across all three time points. Mean Externalizing *T*-scores for the entire sample were 54.72 (*SD* = 11.38) at age 12, 54.68 (*SD* = 11.80) at age 14, and 53.29 (*SD* = 12.03) at age 16. Table 4 conveys these descriptives, as well as the rates of clinical levels of externalizing behavior across maltreatment and control groups.

Covariates: Demographic data collected at age 12 were used as covariates in this study, along with the aforementioned contamination variable. The caregiver interview included demographic information regarding the child's age, sex, and race; caregiver marital status; and family income. For the purposes of the present analysis, and consistent with prior LONGSCAN research, child race was dummy coded into three variables (Black, Hispanic, Other) with Whites representing the reference category (Benedini, Fagan, & Gibson, 2016; Dubowitz et al., 2016). Recruitment site was also dummy coded into four variables with the SW site serving as a reference group. Marital status was dichotomized into divorced/separated versus not divorced/separated. Additionally, a variable representing Adverse Childhood Experiences (ACES) was calculated based on reports of household dysfunction (Felitti et al., 1998; Flaherty

et al., 2009). On average, participants experienced 3 types of household dysfunction ($SD = 2.62$). The ACES and contamination variables were included as covariates to increase the likelihood of detecting an effect given their collinearity with maltreatment status. The inclusion of contamination and other types of trauma as covariates increases confidence that relations between maltreatment and dependent variables are not due to potential confounds.

Data Analytic Strategy

The present study tested whether peer relationships mediated the association between child maltreatment and adolescent externalizing behaviors utilizing a cross-lagged panel mediation model (CLPM; see Figure 1) within the path-analytic framework. Only the hypothesized mediation through peers is highlighted in the figure. Longitudinal carryover is assumed, and covariates are included. CLPM identifies potential mechanisms through mediational tests of multiple pathways simultaneously while controlling for a host of potential confounding variables including prior measurements of the outcome of interest. Results of CLPMs therefore strengthen inferences about causal processes under examination through rigorous statistical modeling of data collected in prospective, multi-wave designs, such as LONGSCAN (Cole & Maxwell, 2003). All models were tested with Mplus 7.0 (Muthén & Muthén, 1998-2017) using maximum likelihood estimation. Path analyses estimated the autoregressive and cross-lagged effects using three repeated observations of child maltreatment, peer relationships, and externalizing behavior. Model fit was assessed using Comparative Fit Index ($CFI \geq 0.95$), Root Mean Square Error of Approximation ($RMSEA \leq 0.06$) and Standard Root Mean Square Residual ($SRMR \leq 0.08$) parameters (Hu & Bentler, 1995). Estimates of the total, direct, and specific indirect pathways from child maltreatment at age 12 to externalizing behavior at age 16 were estimated using the IND command. Confidence intervals were

calculated using the bias-corrected bootstrapping procedure in Mplus based on $k = 5000$ bootstrap samples.

Results

Preliminary Analysis

Due to the complexity of this multisite, longitudinal dataset, there are important analytic considerations to take into account prior to completing the proposed CLPM. Specifically, the assessment of main effects of site on dependent variables and site interaction effects with all other predictors in the model were assessed. A general linear modeling approach revealed no significant main effects for site and other demographic covariates or any moderation of the relations among the variables of interest (i.e. child maltreatment status, peer relationships, and externalizing behavior). Missing values analysis revealed that missingness was not significantly related to the variables of interest across all time points (Peer relationships: $\chi^2(9) = 12.524, p = 0.185$, Externalizing behavior, $\chi^2(9) = 10.467, p = 0.314$).

Path Analytic Model

The specified CLPM provided a good fit to the observed data, CFI = 0.97, RMSEA = 0.04, SRMR = 0.03. The total effect of ever experiencing substantiated child maltreatment prior to age 12 on the severity of externalizing behaviors at age 16 after accounting for all covariates was statistically significant (*Point Estimate* = 2.05, 95% CI = 0.31 - 3.80). The total indirect effect (*Point Estimate* = 1.29, 95% CI = 0.13 - 2.45) was also significant, indicating an overall mediation effect whereby the sum of estimates for all indirect pathways in the CLPM was statistically different from zero. Evidence of mediation was further supported by results of the

direct effect test that demonstrated child maltreatment prior to age 12 no longer predicted the severity of externalizing behaviors at age 16 after accounting for all indirect pathways in the CLPM (*Point Estimate* = 0.76, *95% CI* = -0.10 - 2.51).

While the CLPM provided overall support for mediation, results from the specific indirect tests failed to generate any estimates that were significantly different from zero, although some trended toward significance. Notably, the specific indirect effect testing the hypothesis that negative peer relationships at age 14 would mediate the relationship between experiencing child maltreatment prior to age 12 and externalizing behavior severity at age 16 was not supported (*Point Estimate* = 0.05, *95% CI* = -0.07 - 0.18). Alternative specific indirect effects specified in the CLPM that trended toward statistical significance included the pathway from child maltreatment prior to age 12 to child maltreatment occurring between ages 12 and 14 to externalizing behavior severity at age 16 (*Point Estimate* = 0.18, *95% CI* = -0.02 - 0.39). The percent indirect effect for this pathway was .18, indicating that it accounted for 9% of the variation of the total effect. Similarly, the indirect effect from child maltreatment prior to age 12 to externalizing behavior at 14 to externalizing behavior at age 16 also trended toward significance (*Point Estimate* = 1.05, *95% CI* = -0.92 - 2.20). The percent indirect effect for this pathway was 1.05. This path accounted for 51% of the variation in the total effect. Overall, the results of the specific indirect effects tested in the CLPM suggest that child maltreatment may more directly affect externalizing behavior measured at the successive lag, in this case two years. Results fail to support the notion that maltreatment operates through an independent process, such as negative peer relationships, that in turn affects externalizing behavior two lags out, in this case four years.

Individual path coefficients obtained in the CLPM provide additional information about how child maltreatment prior to age 12 impacts subsequent externalizing behaviors. The autoregressive paths between maltreatment prior to age 12 and maltreatment between ages 12 and 14 was significant, $b = 0.03, p = 0.001$, as was the association between peer relationships at ages 12 and 14, $b = 0.33, p < 0.001$, and peer relationships at ages 14 and 16, $b = 0.52, p < 0.001$. Similarly, the autoregressive paths for externalizing behavior between ages 12 and 14, and 14 and 16, were significant ($b = 0.74, p < 0.001, b = 0.70, p < 0.001$, respectively). After accounting for the autoregressive paths, the individual cross-lagged coefficients were examined. Externalizing behavior at age 12 significantly predicted negative peer relationships at age 14, $b = 0.04, p < 0.001$, and externalizing behavior at age 14 likewise predicted negative peer relationships at age 16, $b = 0.04, p < 0.01$. Maltreatment between ages 12 and 14 also predicted negative peer relationships at age 16, $b = 1.97, p < 0.05$, as well as externalizing behavior at age 16, $b = 6.52, p < 0.05$. Conversely, negative peer relationships at age 14 is associated with subsequent experiences of maltreatment, $b = 0.005, p < 0.05$ (see Figure 2 where bolded pathways represent statistically significant relationships over time).

Discussion

This study examined the role of peers on externalizing behavior during the transition to adolescence following exposure to child maltreatment. This transition period is particularly important for examining problem behaviors, as it facilitates risk for long-term delinquency and juvenile justice involvement. Specifically, the current study assessed whether child maltreatment significantly increased the likelihood for externalizing behavior and whether or not risky peer relationships mediated this association. Adolescents with a history of maltreatment are

significantly more likely than their non-maltreated counterparts to have negative peer relationships (Kim & Cicchetti, 2010) and exhibit early-appearing, ongoing, violent delinquency (English et al., 2002; Moffitt & Caspi, 2001; Villodas et al., 2015). As such, the current study hypothesized that negative peer relationships would mediate the relationship between child maltreatment and subsequent externalizing behaviors as assessed by a cross-lagged mediational model (CLPM). The cross-lagged mediational model is a stringent test of mediation, as it accounts for prior levels of a given variable, allows time to have an effect, and supports causality by testing numerous pathways (Cole & Maxwell 2003; Selig & Preacher, 2009).

Contrary to the hypothesis, results of the current study did not reveal a significant mediation model through peer relationships. Negative peer relationships at age 14 did not significantly explain the association between child maltreatment and externalizing behavior at age 16. However, child maltreatment prior to age 12 did significantly predict externalizing behavior at age 16, and this was, in part, explained by recent maltreatment and recent externalizing behavior (i.e. at age 14). This suggests that there is something important, developmentally speaking, regarding recent maltreatment that sets the stage for behavior problems later in adolescence. Individual pathways revealed compelling relationships between variables of interest over time. As expected, autoregressive pathways for externalizing behavior and peer relationships were statistically significant. Externalizing behavior at ages 12 and 14 predicted later negative peer relationships, suggesting the opportunity to intervene upon early externalizing behavior to prevent further involvement with negative peer influences and reinforcement of maladaptive behavior. Although the converse relationship was hypothesized (i.e. peer relationships predicting externalizing behavior [Laird et al., 2001, Lipsey & Derzon 1998]), research suggests that early appearing externalizing behavior also predicts negative peer

relationships (Kim & Cicchetti, 2010; Moffitt & Caspi 2001), supporting a potential selection effect whereby adolescents self-select into peer groups that reinforce problem behavior. Such engagement with delinquent peer relations significantly reinforces and exacerbates adolescents' externalizing behavior, indicating an important intervention target (Dishion, Spracklen, Andrews, & Patterson, 1996; Lansford, Criss, Pettit, Dodge, & Bates, 2003). An intervention which promotes prosocial behavior and discourages externalizing behavior may disrupt this cycle.

Additionally, results of the present study indicate that maltreatment at age 12 predicts subsequent occurrences of maltreatment, and that maltreatment occurring between ages 12 and 14 predicted negative peer relationships at age 16. Notably, negative peer relationships at age 14 were associated with subsequent maltreatment between ages 14-16. It is possible that negative peer relationships exacerbate conflicts at home and increase the likelihood of maltreatment. It is important that this revictimization be further explored, as studies suggest increased risk for deleterious outcomes following chronic and recent adverse experiences (Bolger & Patterson, 2001; Flaherty et al., 2009). These results lend support to the cycle of victimization (Benedini et al., 2016; Widom, 2014) and increased risk for maltreated youth, indicating an important opportunity for parental intervention in early adolescence.

Numerous explanations for the lack of a mediation effect through peers are plausible. Given that the entire LONGSCAN sample was high-risk, it's possible that there were few differences between the maltreated and non-maltreated groups. Indeed, although maltreated youth did have higher levels of externalizing behavior than their non-maltreated counterparts, (see Table 4), few had levels within the clinical range. Although maltreatment is predictive of externalizing behavior (Thompson et al., 2011, Villodas et al 2015), research also indicates a

strong association between child maltreatment and violent delinquency (English et al., 2002; Lansford et al., 2007; Smith & Thornberry, 1995). Externalizing behavior is related to delinquency, but the latter typically refers to more aggressive, extreme forms of externalizing behaviors (Liu, 2004). It is possible that a mediational effect is more prominent in populations exhibiting more severe types of externalizing behavior. The maltreated sample also had relatively few negative peer relationships at across time. Associating with low-delinquent friends has shown a protective effect among maltreated samples (Salzinger et al., 2007). However, it is likely that specific peer characteristics, such as social support, are more salient (Pepin & Banyard, 2006; Taussig, 2002). It is also possible that the developmental window under study was too early to capture group differences in peer relationships and that recent maltreatment and early-appearing externalizing behavior are the driver of ongoing maladaptation.

The present analysis contributes to the extant research that recent maltreatment and early-appearing externalizing behavior in maltreated populations is associated with ongoing and increasingly severe externalizing behavior. As such, trauma-informed intervention efforts targeting externalizing behavior in maltreated populations at the transition to adolescence are imperative and would likely yield significant real-world impact.

Limitations and Future Directions

In support of the similarities between maltreated and non-maltreated high-risk populations, prior studies utilizing prospective longitudinal data of maltreated families have evaluated the effect of maltreatment allegations as opposed to abstracted substantiations, citing no difference between substantiated and unsubstantiated reports (Hussey et al., 2005; Kohl, Jonson-Reid, & Drake, 2009). Hussey and colleagues (2005) failed to find differences between children with unsubstantiated and substantiated reports of maltreatment for numerous behavioral

and developmental outcomes, suggesting an inability of CPS to reliably detect incidents of maltreatment. Similarly, Kohl, Jonson-Reid, and Drake (2009) found no differences in recidivism rates between substantiated and unsubstantiated cases, indicating continued future risk across samples. These researchers argue that CPS fails to detect incidents of maltreatment and that individuals with unsubstantiated reports remain at high-risk and in need of services. However, the present study controlled for exposure to adverse childhood experiences (Duke et al., 2010; Felitti et al., 1998) and self-reported maltreatment (i.e. contamination; Shenk et al., 2016), in addition to other risk variables (socioeconomic status, maternal education, sex, race), which likely account for the preserved level of risk in unsubstantiated cases. As such, the current study aimed to parse out the unique contributions of confirmed maltreatment.

The current study presents several important limitations. First, the peer relationship measure was adolescent self-report regarding their peers' involvement in antisocial behavior, which presents the possibility of social desirability bias (Fisher, 1993). However, ethical and methodological considerations were taken to ensure privacy and confidentiality to mitigate this risk (Knight et al., 2000). Additionally, the peer relationship measure was limited to a 3-point Likert scale, and had five items assessing prosocial behavior versus thirteen items evaluating antisocial behavior. Future research should consider additional measures that more comprehensively represent the dynamics of the peer relationship. Second, the present study used a dichotomous measure of maltreatment; additional research should evaluate the effects of maltreatment chronicity, frequency, and severity (Barnett et al., 1993). Third, the current study investigated group differences, without examining individual trajectories, failing to capture nuanced variability in adolescent experiences. Additionally, this study was limited by the biennial assessment nature of the design. It's possible that these mediational processes occur on a

larger time scale. Finally, we failed to account for other potentially co-occurring risk factors, including familial and contextual characteristics (Malvaso, Delfabbro, & Day, 2016). For example, parental monitoring is an important construct related to adolescent delinquency and peer relationships (Dishion & MacMahon, 1998). Parental monitoring refers to the parents' knowledge and relative control of their child's behaviors, activities, friends, and whereabouts (Dishion & MacMahon, 1998). Effective monitoring has been shown to indirectly reduce drug use through monitoring of the peer group (Van Ryzin, Fosco, & Dishion, 2012). Incorporating parental monitoring into the present study and investigating relationships among maltreatment subtypes may elucidate the mechanisms that predict adolescent externalizing behavior more effectively.

Similarly, an individual's neighborhood is a critical predictor of delinquency and negative peer associations. Youth in socially disadvantaged neighborhoods are more likely to be rejected by peers and to exhibit externalizing behavior as well as more severe and frequent delinquency (Levanthol & Brooks-Gunn, 2000). Neighborhood collective efficacy, defined as social control and social cohesion within the neighborhood (Sampson, Raudenbush, & Earls, 1997), is a key predictor of adolescent outcomes (Levanthol & Brooks-Gunn, 2000). Physically abused youth who live in high crime neighborhoods with lower levels of collective efficacy are more likely to exhibit antisocial behavior (Jaffee, Caspi, Moffitt, Polo-Tomas, & Taylor, 2007). Collective efficacy is negatively associated with concentrated social disadvantage; however, it mediates the association between this disadvantage and subsequent violence (Sampson et al., 1997). Given that both parental monitoring and neighborhood collective efficacy mutually relate to adolescent peer relationships and externalizing behavior, future research should model these

relationships in a methodologically rigorous manner to further understand causal trajectories through adolescence.

Understanding the relationship between child maltreatment and subsequent delinquent behavior is multifaceted and complex. However, due to pubertal, social, and neurological maturation, adolescence signifies an important transitional period and is an ideal period of intervention. Ongoing research should continue to elucidate the risk and protective mechanisms associated with child maltreatment in an effort to inform intervention and policy. It is important that more prospective longitudinal studies evaluate the ongoing impact of maltreatment to more effectively understand the etiology and consequences of maltreatment and identify causal processes.

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APPENDIX A

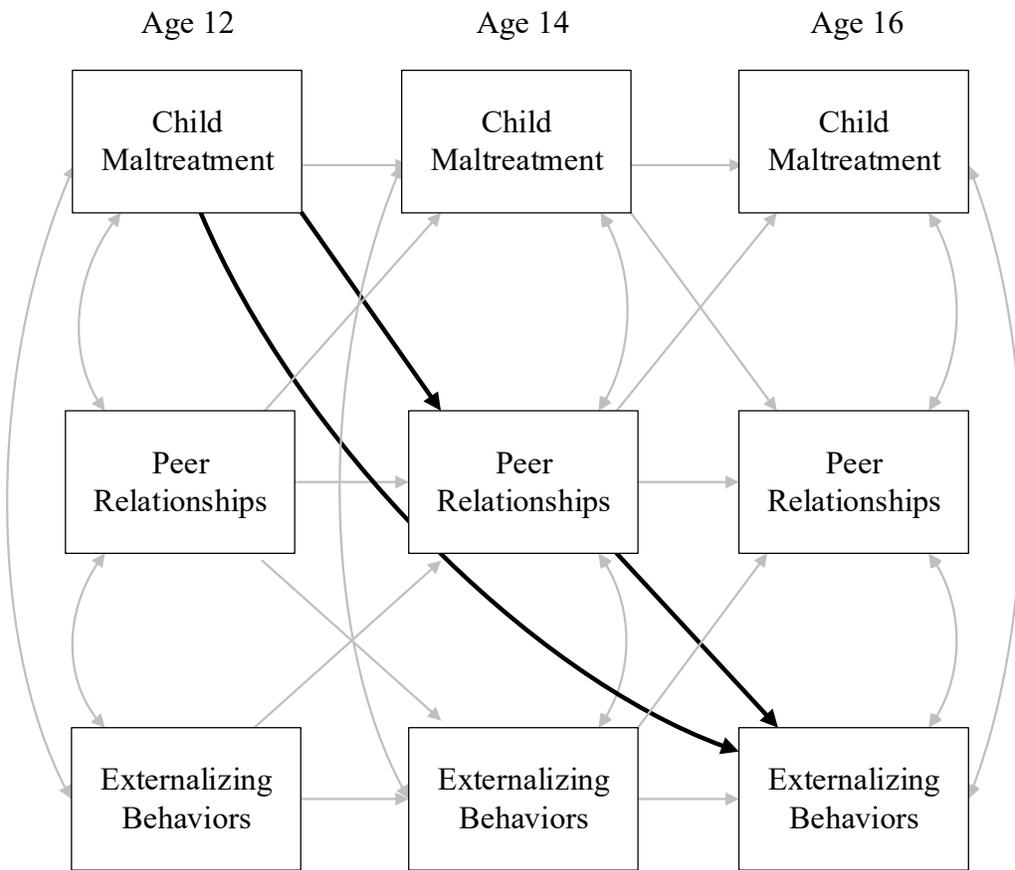
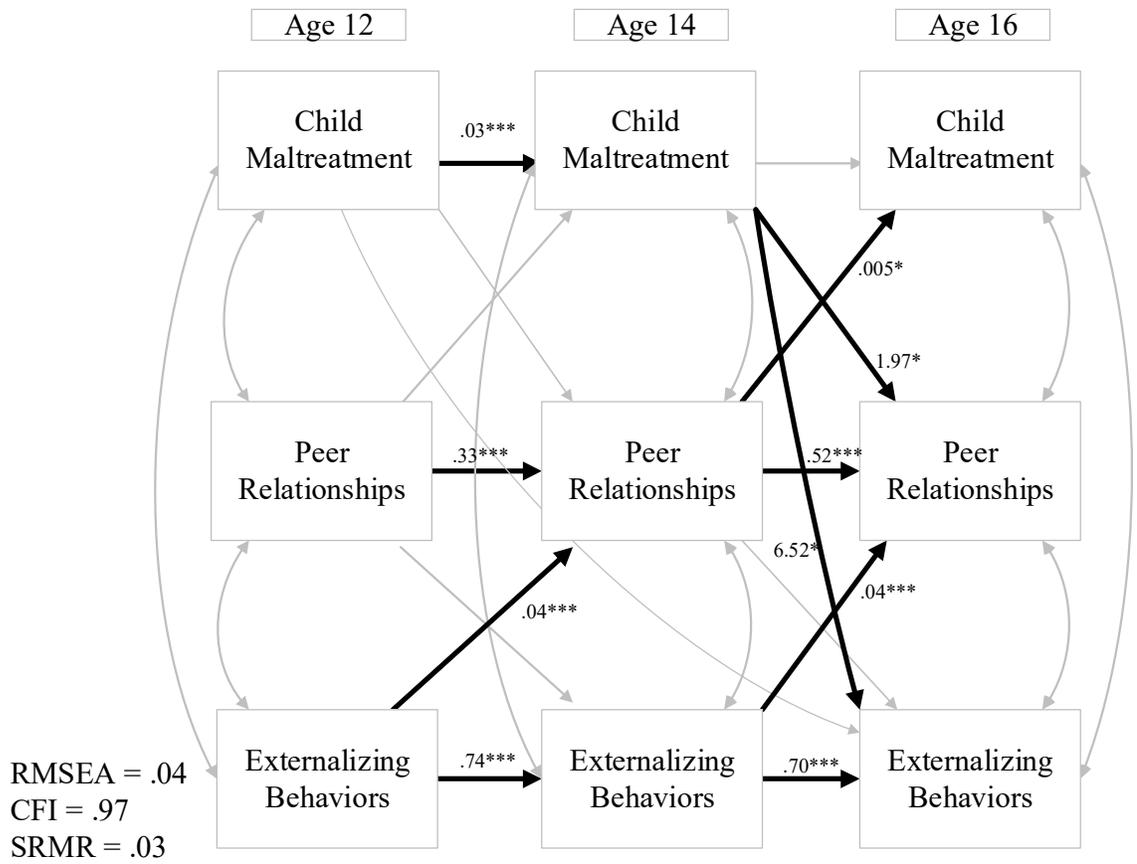


Figure 1: Cross-lagged panel mediation model

Note: included covariates are participant age, sex and race, caregiver marital status and income, site, ACES, and contamination



APPENDIX B

Table 1:

Sample Demographics

	Total sample	Maltreated sample	Non-maltreated sample
	<u>M(SD) or N(%)</u>	<u>M(SD) or N(%)</u>	<u>M(SD) or N(%)</u>
Sex			
Male	657 (48.5%)	321 (46.4%)	336 (50.8%)
Female	697 (51.5%)	371 (53.6%)	326 (49.2%)
Race			
White	354 (26.1%)	202 (29.2%)	152 (23.0%)
Black	721 (53.2%)	314 (45.4%)	407 (61.5%)
Hispanic	97 (7.2%)	57 (8.2%)	40 (6.0%)
Other	181 (13.4%)	118 (17.1%)	63 (9.5%)
Age	12.37 (.44)	12.34 (0.41)	12.40 (0.47)
Median household income	\$20,000-\$24,999	\$25,000-\$29,000	\$20,000-\$24,000
Marital status			
Divorced/Separated	220 (23.1%)	132 (19.1%)	88 (13.3%)
Not divorced/separated	731 (76.3%)	348 (50.3%)	383 (57.9%)
5 or more ACES	351 (25.9%)	198 (28.6%)	153 (23.1%)
Contamination	352 (26.0%)	N/A	352 (53.2%)

Table 2:

Frequency of Substantiated Maltreatment

	Prior to Age 12	Ages 12-14	Ages 14-16
	<u>N(%)</u>	<u>N(%)</u>	<u>N(%)</u>
Substantiated Maltreatment	692(51.1%)	34(2.5%)	39(2.9%)
No Substantiated Maltreatment	662(48.9%)	1320(97.5%)	1315(97.1%)

Table 3:

Average Number of Negative Peer Relationships

	Total sample	Maltreated sample	Non-maltreated sample
	<u>M(SD)</u>	<u>M(SD)</u>	<u>M(SD)</u>
Age 12	1.22 (2.33)	1.13 (2.29)	1.30 (2.37)
Age 14	2.65 (3.21)	2.69 (3.17)	2.60 (3.24)
Age 16	4.46 (3.89)	4.52 (3.75)	4.40 (4.03)

Table 4

Average Levels of Externalizing Behavior

	Total sample	Maltreated sample	Non-maltreated sample
Age 12	<u>M(SD) or N(%)</u>	<u>M(SD) or N(%)</u>	<u>M(SD) or N(%)</u>
Externalizing behavior	54.72 (11.38)	56.28 (11.26)	53.14 (11.30)
Above clinical cutoff	213 (15.7%)	124 (17.9%)	89 (13.4%)
Below clinical cutoff	738 (54.5%)	355 (51.3%)	383 (57.9%)
Age 14			
Externalizing behavior	54.68 (11.80)	56.64 (11.34)	52.77 (11.36)
Above clinical cutoff	224 (16.5%)	139 (20.1%)	85 (12.8%)
Below clinical cutoff	706 (52.1%)	320 (46.2%)	386 (58.3%)
Age 16			
Externalizing behavior	53.28 (12.03)	54.73 (12.13)	51.74 (11.75)
Above clinical cutoff	165 (12.5%)	101 (14.6%)	64 (9.7%)
Below clinical cutoff	702 (51.8%)	347 (50.1%)	355 (53.6%)

Note: Reductions in sample size reflect failure to complete age 12, 14, or 16 assessments