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Child Maltreatment and Risky Sexual Behavior: Indirect Effects Through Trauma Symptoms and Substance Use

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Abstract

Risky sexual behavior is a serious public health problem. Child sexual abuse is an established risk factor, but other forms of maltreatment appear to elevate risky behavior. The mechanisms by which child maltreatment influence risk are not well understood. This study used data from 859 high-risk youth, followed through age 18. Official reports of each form of maltreatment were coded. At age 16, potential mediators (trauma symptoms and substance use) were assessed. At age 18, risky sexual behavior (more than four partners, unprotected sex, unassertiveness in sexual refusal) was assessed. Neglect significantly predicted unprotected sex. Substance use predicted unprotected sex and four or more partners but did not mediate the effects of maltreatment. Trauma symptoms predicted unprotected sex and mediated effects of emotional maltreatment on unprotected sex and on assertiveness in sexual refusal and the effects of sexual abuse on unprotected sex. Both neglect and emotional maltreatment emerged as important factors in risky sexual behavior. Trauma symptoms appear to be an important pathway by which maltreatment confers risk for risky sexual behavior. Interventions to reduce risky sexual behavior should include assessment and treatment for trauma symptoms and for history of child maltreatment in all its forms.

Keywords

sexual behavior problems; adolescents; youth

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Importance of Sexually Risky Behaviors

Sexually risky behaviors place adolescents at risk for adverse health and social outcomes. There are approximately 20 million new sexually transmitted infections (STIs) annually within the United States (Centers for Disease Control and Prevention [CDC], 2013) and roughly half occur among youth aged 15–24 years old (Satterwhite et al., 2008). Despite some recent declines (CDC, 2013), the United States continues to report the highest teenage birth rate among high-income countries (United Nations, 2010). Early parenthood can dramatically influence life trajectories, in terms of health, education, and income (CDC, 2013). Thus, late adolescence and early adulthood are the period of greatest jeopardy for sexual risk-taking, with long-lasting implications for health and well-being (CDC, 2013; Satterwhite et al., 2008).

In terms of particular types of risky sexual behavior, research has typically focused on unprotected—condomless—sex, as condoms are a very reliable way of preventing both unintended pregnancy and STI transmission (Fowler, Motley, Zhang, Rolls-Reutz, & Landsverk, 2015; van de Bongardt, Reitz, Sandford, & Dekovic, 2015). Other indicators of sexual risk behavior have also been studied; in general, different forms of risk behavior tend to correlate quite highly (Fowler et al., 2015). The number of sexual partners is also a common concern in adolescent populations, where higher numbers of sex partners are associated with risk of subsequent STIs (Scott et al., 2011). Relatedly, the self-efficacy to refuse sex is rarely conceptualized alongside other risky sexual behaviors. Difficulty in refusing sex when unwanted, however, is an important predictor of problematic outcomes (Downing-Matibag & Geisinger, 2009).

Association Between Child Maltreatment and Sexually Risky Behaviors

Child maltreatment, like other forms of adversity, has been linked with risky sexual behavior including higher number of partners (Felitti et al., 1998; Hahm, Lee, Ozonoff, & Van Wert, 2010), early initiation of sexual behavior (Hahm et al., 2010), and engagement in transactional sex (Hahm et al., 2010), as well as negative outcomes of risky sexual behavior such as higher prevalence of STIs (Felitti et al., 1998; Hahm et al., 2010). Most of the research examining links between child maltreatment and risky sexual behavior has focused on sexual abuse in particular. Accordingly, the most consistent findings have been for this form of maltreatment. In particular, in a variety of samples, both high-risk (Jones et al., 2010) and general population (Noll, Haralson, Butler, & Shenk, 2011), sexual abuse strongly predicted several risky sexual behaviors (Jones et al., 2010; Melander & Tyler, 2010; Noll et al., 2011). There is equivocal evidence that other forms of maltreatment are also important predictors of risky sexual behavior. Several studies examining physical or emotional abuse failed to find significant association between physical and emotional abuse and risky sexual behaviors (Banducci, Hoffman, Lejuez, & Koenen, 2014; Plottzker, Metzger, & Holmes, 2007). However, other research using the LONGitudinal Studies on Child Abuse and Neglect (LONGSCAN) sample has found unique effects of physical abuse and emotional maltreatment (Black et al., 2009; Jones et al., 2010) or neglect (Thompson & Neilson, 2014), even after controlling for sexual abuse. Other research suggests that the history of any form of maltreatment appears to drive the risk (Brown, Cohen, Chen, Smailes, & Johnson,

2004; Noll & Shenk, 2013). Much of the research relies on adults' or youths' self-reported maltreatment histories, usually assessed at the same time as risky sexual behaviors (e.g., Felitti et al., 1998). There is a dearth of prospective research examining these links.

Trauma Symptoms and Substance Use as Potential Mediators

The link between distal experiences of maltreatment and risky sexual behavior is vital in designing prevention and intervention strategies. Miller (1999) has proposed a theory explaining the association between child sexual abuse and HIV risk behavior for women in which psychopathology and drug use mediate childhood sexual abuse (CSA) and sexual risk-taking (Miller, 1999). In this model, substance use is a means of coping with the experience of maltreatment, of blunting the negative emotions arising from the experience (and memories) of being maltreated. Psychopathology, in particular, posttraumatic and other dissociative symptoms, is also a means of psychological distancing and self-protection. In turn, Miller (1999) suggests, both emotional numbing associated with posttraumatic stress and substance use make youth more likely to engage in risky sexual behavior. Although the model originally focused on women who had experienced sexual abuse, there is some support for the model among men (Senn, Carey, Venable, Coury-Doniger, & Urban, 2006). Although effects of other forms of maltreatment are less commonly studied, past research suggests that physical abuse, neglect, and emotional maltreatment all play similar roles in risk for sexual risk-taking the associated mediators (Kang, Deren, & Goldstein, 2002; Thompson & Neilson, 2014).

Although the model has been incompletely tested, there is some circumstantial evidence to support it. All forms of maltreatment are associated with increased risk of psychopathology, particularly post-traumatic stress disorder (PTSD; Ballard et al., 2015; for review, see Gabbay, Oatis, Silva, & Hirsch, 2004). There is some evidence that this link with PTSD is particular to child maltreatment: Individuals who experienced trauma by a trusted adult were at greater risk for PTSD than trauma caused by a nontrusted adult (Gamache, Van Ryzin, & Dishion, In Press). Maltreatment in general is also linked to drug and alcohol use (Kilpatrick et al., 2000), although this link varies by type of maltreatment and substance. For example, sexual abuse is most strongly associated with adolescent binge drinking (Shin, Edwards, & Heeren, 2009), while chronic maltreatment, especially neglect, is most strongly associated with heavy marijuana use (Dubowitz et al., 2016).

In turn, both trauma symptoms and substance use are associated with risky sex, although these links have not been tested in a wide variety of populations. PTSD has been associated with risky sexual practices in veteran samples (Strom et al., 2012) and in men who have sex with men (Beidas, Birkett, Newcomb, & Mustanski, 2012). For both women and men, traumatic intrusion—a symptom of PTSD—was associated with risky sexual behavior (Walsh, Latzman, & Latzman, 2014). When examining women's in-the-moment unprotected sexual risk intentions, trauma symptoms indirectly predicted women's likelihood to engage in condomless sex. There is also some evidence that PTSD mediates the association between CSA and risky sexual behaviors (Plotzker, Metzger, & Holmes, 2007).

Substance use is also associated with sexual risk behavior. Alcohol problems are associated with willingness to engage in unprotected or otherwise risky sex (Walsh et al., 2014) and with sexual risk-taking behavior (Masters et al., 2014), possibly because acute intoxication has a disinhibiting effect (Steele & Josephs, 1990). General substance use is also associated with unprotected sex (Oshri, Tubman, & Burnette, 2012).

Although there is a great deal of evidence to suggest the plausibility of Miller's (1999) model, it has not been comprehensively tested. Few studies have directly examined the question of mediation, and fewer still have tested mediation in a temporal sequence or tested both posttraumatic stress symptoms and substance use simultaneously. Further, as noted, there has been far more research on sexual abuse than on other forms of maltreatment.

The Current Study

In summary, there is considerable evidence that child maltreatment is associated with risky sexual behavior. Substance use and trauma symptoms have been implicated both as consequences of maltreatment and predictors of risky sexual behavior. Some studies indicate alcohol use and trauma symptoms may play a role in explaining the links between child maltreatment and risky sexual behavior. However, limitations of this literature include retrospective recall of maltreatment, limited focus on maltreatment beyond CSA, small samples, and cross-sectional studies. The current study extends this research by utilizing a longitudinal, prospective study with a large sample of youth followed from age 4 through age 18. We examined the role of specific maltreatment types (birth to age 12), mediated by substance use and trauma symptoms (assessed at age 16), on sexual risk-taking at age 18. Direct and indirect pathways of the proposed mediators were examined. It was hypothesized that sexual abuse as well as both substance use and trauma symptoms would have direct effects on sexual risk-taking and that substance use and trauma symptoms would mediate effects of maltreatment, particularly sexual abuse. Because of the paucity of research on other forms of maltreatment, it was predicted that the effects would be similar to those for sexual abuse.

Method

Sample and Design

The analyses presented here used the LONGSCAN (Runyan et al., 1998) sample. LONGSCAN is a five-site longitudinal study of the predictors and sequelae of child maltreatment. Detailed information on study design and subject recruitment are available (Runyan et al., 1998) but are briefly summarized here. Participating children and their primary caregivers were followed from age 4 through age 18. Each site had recruited child-caregiver dyads based on criteria that varied by site but included risk for or exposure to child maltreatment. Two sites included children who had been reported as maltreated, two included children at elevated risk for maltreatment due to demographic and/or family factors, and one included both children reported as maltreated and children at elevated risk for maltreatment. Thus, the sample included children who had officially reported maltreatment as well as children who had no officially reported maltreatment. Each site obtained approval from their respective institutional review boards. For each interview

through age 16, the primary caregiver provided informed consent for themselves and the youth participating in the study, and youth provided their assent. At age 18, youth provided informed consent.

The initial baseline sample for the LONGSCAN studies comprised 1,354 child-caregiver dyads. Follow-up interviews with caregivers and children and periodic reviews of official reports of child protective services (CPS) were conducted at regular time intervals defined by child age. Face-to-face interviews were conducted at child ages 4, 6, 8, 12, 14, 16, and 18, and reviews of maltreatment reports were conducted biannually.

The analysis sample included the 859 (63.4%) dyads who had completed the age 16 and age 18 interviews. As discussed below, the model of indirect effects used all available data for the estimation of each relationship. The analysis sample was not significantly different from those excluded in terms of rate of official reports of maltreatment, gender, or race.

Descriptive information on the analysis sample is presented in Table 1.

Measures

Risky sexual behaviors—The risky sexual behaviors examined here were assessed at age 18 using 3 single-item measures from a larger study-developed assessment of sexual experiences and parenting status (Knight, Smith, Martin, & the LONGSCAN Investigators, 2009). Two of the outcomes were continuous but were dichotomized in line with prior research (e.g., Klein & Committee on Adolescence, 2005). In each case, the outcome indicative of risk was coded as 1, and the outcome indicative of lack of risk was coded as 0. For the current study, the following three outcomes were examined:

1. Lack of condom use at last sexual intercourse: Participants were asked “What methods of protection did you or your partner use the last time you had sex?” If the respondent did not indicate use of a condom, then no condom use was coded as 1. Use of a condom or no intercourse was coded as 0. This is a commonly used indicator of general condom use and is a reasonable, albeit conservative, estimate of unprotected sexual intercourse (Younge et al., 2008);
2. Number of sexual partners: Respondents were asked “During your life, how many different boys or men/girls or women have you had sex with?” Response options included 0,1,2, 3,4 to 5, and 6 or more. Consistent with prior research, these were dichotomized such that those with four or more were considered high risk (Klein and the Committee on Adolescence, 2005); and
3. Low self-efficacy to refuse sex: Self-efficacy to refuse sex was assessed by asking “If you did not want to have sex, how sure are you that you could keep from having sex?” Responses included *very sure* (1), *sort of sure* (2), *not too sure* (3), and *I probably couldn't* (4). Those answering *not too sure* and *probably couldn't* were coded as low self-efficacy (=1).

Child maltreatment history—LONGSCAN conducted periodic reviews of administrative CPS data approximately every 2 years, providing CPS-reported maltreatment from birth to age 12, using trained coders. CPS case narratives were abstracted and coded

for the presence of reported maltreatment using the modified maltreatment classification system (MMCS; Barnett, Manly, & Cicchetti, 1993; English & LONGSCAN Investigators, 1997). This enabled the standardization of maltreatment types across sites. Using the MMCS, type of maltreatment was coded into four nonmutually exclusive categories: physical abuse, sexual abuse, emotional maltreatment (emotional abuse or neglect), and physical neglect. Because a large portion of the sample was selected for maltreatment at recruitment (i.e., age 4 or 6), most of the maltreated children had reports of maltreatment by this age, although some also had subsequent reported maltreatment.

Potential mediating variables—Potential mediating variables were youth self-reports at age 16 of trauma symptoms and substance use.

Trauma symptoms—Trauma symptoms were assessed at age 16 with the Trauma Symptom Checklist for Children (TSCC; Briere, 1996). Raw scores for six clinical scales are derived and include: anxiety, depression, posttraumatic stress, sexual concerns, anger, and dissociation.

Substance use—Respondents indicated if they had used alcohol, marijuana, cigarettes, and/or other illicit drugs in the last year. For each substance, if the respondent answered “yes,” they were asked to indicate how often in the last 30 days they used the substance. Response options ranged from 0 to 30 days; alcohol, marijuana, and cigarettes had scores ranging from 0 to 30 days. Other illicit drug use was dichotomized: If the respondent indicated they had used any other illicit drug (e.g., cocaine, lysergic acid diethylamide, ecstasy, nonprescribed prescription drugs, etc.) in the past year, this was coded as 1 (0 if not).

Control variables—Study site, gender, and race/ethnicity of the target youth were included in all analyses as control variables. Race/ethnicity was coded as White, African American, and Other. Most of those included in the “Other” category self-identified as Hispanic or biracial, although very small numbers of children identifying as Asian/Pacific Islander or Native American were also included in the sample. Other was the reference group.

Analyses

The primary focus of this article was to examine (1) the link between each form of childhood maltreatment and risky sexual behavior and (2) both trauma symptoms and substance use as potential mediators of this link. This was done using multiple mediation models, which allow the examination of simultaneous mediation by more than one variable in a fully multivariate context (Preacher & Hayes, 2008). In this study, the overall indirect effect of both trauma symptoms and substance use was examined, as well as specific indirect effects of each potential mediator.

The primary interest was in understanding how trauma symptoms and substance use mediated the effects of maltreatment on risky sexual behavior. In addition, there were very high levels of intercorrelation among the trauma symptom scales and among the indicators of substance use; including each separate trauma symptom scale and each form of substance

use. Because this would have resulted in a great deal of multicollinearity, preliminary data reduction was conducted to simplify the potential models and avoid this multicollinearity. Specifically, a single factor representing trauma symptoms was created by conducting exploratory factor analysis (EFA) deriving a single factor. A single factor representing substance use was also created via exploratory factor analyses; although illegal drug use was a dichotomous variable, factor solutions with dichotomous variables are not substantially altered (Percy, 1976). The measurement model for these two factors was adequate to good (Hu & Bentler, 1999), depending on the fit index used (Root Mean Square Error of Approximation (RMSEA) = .08 or adequate fit; Standardized Root Mean Residual (SRMR) = .05 or good fit). These factors were modeled as latent variables in the remainder of the analyses.

The next step was to estimate indirect effects. Traditionally, the causal step process (Baron & Kenny, 1986) has been used, wherein main effects are first tested, then controlled effects, and inferences made from the differences between these effects. However, this approach has been criticized (Hayes, 2009) as: (1) underpowered to detect indirect effects; (2) relying on inference rather than direct statistical test of indirect effects; and (3) difficult to apply to multiple simultaneous mediators. Thus, the bootstrap estimation test of indirect effects was used (Preacher & Hayes, 2008) in the current analyses. Bootstrap estimation uses the initial sample to generate multiple random samples which are the basis for parameter estimates. This was conducted using Hayes' (2009) macro INDIRECT and run on SPSS version 21.0. In cases where the outcome variable is dichotomous, as here, INDIRECT uses a logistic regression framework (Hayes, 2009). As recommended (Hayes, 2009; Preacher & Hayes, 2008), 5,000 samples were used to provide parameter estimates and confidence intervals (CIs). If these 95% CIs did not include 0, this indicated that the indirect effect of the mediator was significant at $p < .05$ (Preacher & Hayes, 2008). Missing data were treated using listwise deletion.

The general model for these analyses is presented in Figure 1. Not represented in this figure are the covariates (site, race, gender), which were dummy coded and included in the model; all links described here represent relationships obtained after taking into account these variables. Coefficient a in Figure 1 represent the link between each form of maltreatment and each potential mediator; Coefficient b represent the link between each potential mediator and each risky sexual behavior; and Coefficient c represents the total effect of maltreatment on risky sexual behavior; Coefficient c' represents the remaining direct effect of maltreatment on risky sexual behavior after partialing out indirect effects. It is important to note that Coefficient c is the equivalent of a direct effect between maltreatment and risky sexual behavior in a multivariate context. The indirect effect is the product of Coefficients a and b for each specific indirect effect in this context, while the general indirect effect is the sum of these products. κ^2 was reported as a test of the effect size of mediated models, as recommended by Preacher and Kelly (2011).

We also performed secondary analyses to test the robustness of our findings. First, we reestimated our models for posttraumatic stress symptoms, replacing the single factor of posttraumatic stress symptoms with the component subscales of the TSCC. We made similar substitutions for the component measures of the single factor substance use variable.

Results

Descriptive Data on Predictors, Potential Mediators, and Outcomes

Table 1 presents descriptive data on the sample. More than half of the sample (56.2%) had been reported to CPS for neglect between birth and age 12, and slightly less than one third had been reported for physical abuse (30.0%) and emotional maltreatment (31.0%) in this period. A smaller proportion (15.7%) had been reported for sexual abuse. Trauma symptoms and substance use at age 16 were both in line with descriptive data on general population samples. Nearly, half of the sample (42.2%) reported having had four or more partners. A much smaller proportion of the sample (12.5%) reported low sexual self-efficacy, while roughly one in five (19.0%) reported having had unprotected sex in their last sexual encounter. The results of the EFAs for trauma symptoms and substance use are also reported in Table 1.

Mediation Models Predicting Outcomes

The mediation models predicting the three outcomes are outlined in Figure 1 and presented in detail in Tables 2–4. The *a* paths, representing the direct effects of maltreatment on trauma symptoms and on substance use, are consistent across models. As can be seen, emotional maltreatment and sexual abuse were significantly associated with potential mediator trauma symptoms. Neither physical abuse nor neglect were significantly associated with potential mediator trauma symptoms, and no form of maltreatment was significantly associated with potential mediator substance use.

Mediation model predicting four or more partners—The mediation models predicting four or more partners are described in Table 2. There were no significant direct (*c*) or indirect (*c'*) effects of any form of maltreatment on four or more partners. There was no significant effect of potential mediator trauma symptoms on this outcome but a very strong and significant association between potential mediator substance use and four or more partners.

In addition to the effects presented in the table, in the multivariate model, there was a significant effect of male gender predicting four or more partners ($B = .45$; $SE = .21$, $p < .05$). Site failed to significantly predict four or more partners (minimum $p = .11$), as did race, although a protective effect for White race approached significance ($B = -.48$; $SE = .28$, $p = .08$).

Mediation model predicting low sexual self-efficacy—The mediation models predicting low sexual self-efficacy are described in Table 3. There were no significant direct effects of maltreatment on low sexual self-efficacy. There were no significant effects of potential mediators trauma symptoms and substance use on this outcome. However, there was a significant indirect effect of emotional maltreatment on low sexual self-efficacy, specifically through trauma symptoms.

In addition to the effects presented in the table, in the multivariate model, there was no effect of male gender predicting low sexual self-efficacy ($B = .16$; $SE = .33$, $p = .40$). Site failed to

significantly predict low sexual self-efficacy (minimum $p = .61$), as did race (minimum $p = .11$).

Mediation model predicting failure to use condoms—The mediation models predicting failure to use condoms are described in Table 4. There were significant independent effects of potential mediators trauma symptoms and substance use on this outcome. There were also significant main effects of neglect on risk for failure to use condoms, and these effects were not significantly affected by the potential mediators. However, there were also significant indirect effects on the link between emotional maltreatment and failure to use condoms, in the block of potential mediators, and specifically through trauma symptoms. There were also significant indirect effects on the link between sexual abuse and failure to use condoms and also in the block of potential mediators and specifically through trauma symptoms.

In addition to the effects presented in the table, in the multivariate model, male gender was associated with unprotected sex ($B = -.58$; $SE = .26$, $p < .05$). Site failed to significantly predict unprotected sex (minimum $p = .07$), as did race (minimum $p = .55$).

Robustness tests—Robustness tests conducted for posttraumatic symptoms with the alternative specifications described above yielded largely similar findings, with two notable exceptions (not shown). First, there were some differences for effects of maltreatment on trauma symptoms. Specifically, although the main effects of emotional maltreatment on posttraumatic symptoms reached significance for most individual subscales uniquely, it did not do so for anger or sexual concerns. On the other hand, the main effect of sexual abuse this was significant only for anger. This was true for each of the models for each of the three outcomes. Second, when the subscales were entered rather than the factor, the indirect effects of none of these subscales were significant for either low sexual self-efficacy or unprotected sex. Replacing substance use factor with the component items did not change the results.

Discussion

There were four main findings of this study. There was a main effect of neglect on unprotected sex. There were main effects of substance use on having four or more sexual partners and engaging in unprotected sex. There were, however, no mediating effects of substance use on the link between maltreatment and risky sexual behavior. In contrast, trauma symptoms strongly predicted having engaged in unprotected sex and also had the following mediating effects: the effects of both emotional maltreatment and sexual abuse on unprotected sex and the effects of emotional maltreatment on sexual self-efficacy.

This represents very limited support for the initial model that guided this research (Miller, 1999) but also expand its support in a somewhat new direction. Specifically, the evidence for the model was sparse in considering sexual abuse, the original trauma that was the focus of the model. Instead, there was far more support for psychological maltreatment as an initial trauma that is mediated by trauma symptoms. On the other hand, there was no evidence for

substance use as a mediator in this sample. Below, we contextualize these findings in the context of the broader literature.

The effects of sexual abuse appear to be well established (Jones et al., 2010), and the evidence for an effect of emotional maltreatment is growing (Black et al., 2009; Jones et al., 2010). The role of trauma symptoms as mediating the link between maltreatment and risky sex may suggest a negative affect pathway: Individuals with victimization histories may evince trauma symptoms which they may cope with by engaging in anxiety-reducing health risk behaviors such as sexual risk-taking (Littleton, Grills-Taquechel, Buck, Rosman, & Dodd, 2013). In other words, youth with a history of child maltreatment may use risky sex as an affect regulation strategy (Orcutt, Cooper, & Garcia, 2005). Youth coping with trauma related to emotional maltreatment or sexual abuse may engage in high levels of sexual activity in general and unprotected sex in particular. Indeed, youth who both engage in risky sex and substance use may have problems with emotion regulation or coping that are expressed in this way. A qualification of this is that a high number of partners was only predicted by substance use, and neither substance use nor trauma symptoms mediated effects of maltreatment.

It is possible that emotional maltreatment and sexual abuse are particularly evocative of the shame and self-esteem components of trauma symptoms (Rahm, Renck, & Rinsberg, 2013) which are known to influence condom self-efficacy and nonuse (Masters et al., 2014). Growing evidence suggests emotional maltreatment is particularly detrimental to well-being in emerging adulthood; it is associated with trauma symptoms, substance use, and unprotected sex (English, Thompson, & White, 2015). Sexual abuse is also consistently linked with feelings of shame and low self-worth for both male and female survivors (Feiring & Taska, 2005; Payne et al., 2014). If participants do not feel they deserve or have a right to advocacy and protected sex, they may be unlikely to insist upon a condom. These adolescents may have begun a path that has been observed within experimental paradigms with adult samples in which sexual abuse predicts condom nonuse among women (Masters et al., 2014) and indirectly predicts condom use resistance among men (Davis et al., 2012). Individuals with trauma symptoms may be hypervigilant to cues of partner disapproval and forgo condom use (Stoner et al., 2008). It is important to highlight that condom use is important whether youth consider themselves in an “exclusive” relationship or not; condoms protect against STIs, highly prevalent at this age and serial monogamy appears to further elevate risk for STIs, in part by making condom use less likely (Conley, Matsick, Moors, Ziegler, & Rubin, 2015).

Contrary to hypotheses, substance use did not mediate the relation between child maltreatment history and any of the outcomes examined but did predict the number of sexual partners. This may be because sexual risk and substance use comprise a larger syndrome of adolescent risk. Engagement in substance use in adolescence is associated with greater risk-taking, which has been attributed to neuroticism and sensation seeking; thus, substance use and risky sexual behavior may be part of a broader syndrome of risk, precluding the mediation model tested here (Cooper, Wood, Orcutt, & Albino, 2003). On the other hand, there was no apparent effect of substance use on condom use or sexual self-efficacy. It is

also possible that the absence of this relationship is attributable to the limited rates of substance use within the sample.

These analyses complement earlier analyses using this sample at earlier ages (Black et al., 2009; Jones et al., 2010; Thompson & Neilson, 2014). As noted earlier, these prior analyses focused on the sample at a younger age (Black et al., 2009; Jones et al., 2010) or examined only one outcome in one of the five component samples (Thompson & Neilson, 2014). The current analyses had the advantage of additional time of exposure to potential maltreatment, as well as the outcomes measured at age 18, highlighting the importance for early adulthood. As well, as we discuss at more length later, the current analytic strategy was more stringent with respect to causal inferences, although this also was a more conservative approach.

There are several important limitations to this set of analyses. This is a high-risk sample with higher rates of physical abuse and neglect and emotional maltreatment than those reported in national research (U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, 2015). This was also a multisite study with different sites representing different levels of exposure to risk and different regions of the United States. In these analyses, site was controlled for; doing so very likely attenuated some effects of maltreatment that might have emerged in a more homogenous sample, or one where site and exposure to maltreatment were orthogonal. In addition, gender was treated as a covariate; boys were at elevated risk for a high number of partners and at lower risk for unprotected sex. Further research should examine gender-specific models, which there was not power to do in these analyses. It is also important to acknowledge that the outcomes examined were dichotomized; such dichotomization, although common (e.g., Klein and the Committee on Adolescence, 2005), can be associated with reduced power. On the other hand, it is not clear that risk is conferred in a linear fashion by number of partner; thus, the data were dichotomized to indicate levels that are less ambiguously risky (Klein and the Committee on Adolescence, 2005).

There were meaningful spans of time between when the mediators and outcomes were assessed, particularly as it relates to substance use. This allowed a relatively stringent test of mediation, but it also precluded testing of the co-occurrence of substance use and risky sexual behavior. Future research should investigate whether participants are engaging in alcohol- or drug-involved sex. On a related front, the effects of substance use were assessed with somewhat lower power than those of trauma, likely related to differences in measurement. Other variables may be important that were not included in this study. In particular, the timing of maltreatment and multiple forms of maltreatment (English, Bangdiwala, & Runyan, 2005) may be important but were subsumed here within type of maltreatment. Family income and community factors may influence outcomes; family income has typically not predicted outcomes within LONGSCAN (e.g., Jones et al., 2010), likely due to limited variation, and so was not included in these analyses.

Although it was a control variable, gender predicted two of the three outcomes examined. Specifically, male gender was associated with a higher likelihood of four or more partners and a lower likelihood of failing to use a condom. That boys are more likely to use condoms has been found in prior research (e.g., Miller, Levin, Whitaker, & Xu, 1998), and combined

with the higher likelihood of four or more partners suggests that one outcome may be perceived as reducing the effects of the other.

Finally, although the approach to data analysis presented here provides evidence that maltreatment experiences prospectively predict risky sexual behaviors, it is also likely that these variables have a bidirectional relationship, at least for some youth (Fowler et al., 2015). A related concern is that this analysis did not control for prior sexual risk behavior nor for earlier substance use or trauma symptoms. As such, these findings are suggestive but ultimately correlational. An additional concern with the analytic approach used is that it did not allow simultaneous consideration of different outcomes. As such, three separate models were examined, one for each outcome. Although this is superior to separate testing of each potential mediator (Hayes, 2009), it does somewhat elevate alpha wise error likelihood. Finally, the treatment of trauma symptoms and substance use as latent variables provided some indication of potential mediators, but a more detailed analysis of the subtypes, beyond the scope of this analysis, would be a valuable next step.

Nevertheless, these findings also have important clinical implications. Clinicians should include assessment of emotional maltreatment and implementation of parenting and child-focused interventions (e.g., psychotherapy, parenting skills training) to ameliorate the short- and long-term outcomes on sexual risk-taking. Targeting trauma symptoms through evidence-based treatments for maltreatment (e.g., Trauma-Focused Cognitive Behavioral Therapy) may have downstream effects on sexual risk-taking, particularly for at-risk youth. Such focused treatments should be refined and evaluated in this context. Treatment of adolescents who are engaged in sexual risk-taking should include not only assessment of physical and sexual trauma but also assessment of past or current emotional maltreatment.

Overall, the results of this study indicate that posttraumatic stress symptoms served as a pathway by which child maltreatment increased adolescent sexual risk-taking, suggesting that these constructs could be targeted in intervention efforts aimed at STI transmission and unintended pregnancy. Taken together with earlier research (e.g., Thompson & Neilson, 2014), this suggests that trauma symptoms may be a key to understanding many youth engaging in risky sexual behavior. Beyond supporting prior findings that child sexual abuse is associated with sexual risk-taking, the current study extended the understanding of emotional maltreatment as an important contributor to later health behaviors. These findings also underscore the relevance and importance of assessing and intervening in children and adolescents' mental health to prevent and intervene in sexual risk-taking. Although additional research is needed to ascertain the role of substance use during this critical period, the current study contributes to the growing literature on the effects of child maltreatment. Consideration of both background and individual-level factors may enhance the effectiveness of sexual risk prevention and intervention efforts.

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Figure 1.

A general multiple mediation model of the relationship between maltreatment and risky sexual behaviors.

Table 1.Descriptive Information on the Analysis Sample ($N = 859$).

Variable	% (n) or M (SD)	EFA Loading
Demographic and control variables		
Site		
Eastern	22.8 (196)	
Southeastern	18.5 (159)	
Midwest	16.8 (144)	
Northwest	20.6 (177)	
Southwest	21.3 (183)	
Gender		
Female	55.6 (478)	
Male	44.4 (381)	
Race/ethnicity		
White	24.9 (214)	
African American	55.3 (475)	
Other	19.8 (170)	
Outcomes		
Number of sexual partners		
0–3	57.8 (492)	
4 or more	42.2 (360)	
Could keep from having sex if I wanted to		
Yes	87.5 (744)	
No	12.5 (107)	
At last sexual intercourse, used condom		
No sex or used condom	81.0 (696)	
Had sex, no condom	19.0 (163)	
Child maltreatment		
Any maltreatment	63.2 (543)	
Physical abuse	30.0% (258)	
Sexual abuse	15.7 (135)	
Neglect	56.2 (483)	
Emotional maltreatment	31.0 (266)	
Trauma symptoms age 16		
Anxiety	3.18 (3.50)	.88
Depression	3.84 (4.20)	.89
Anger	5.08 (4.98)	.81
Posttraumatic stress	4.73 (4.86)	.91
Dissociation	4.65 (4.44)	.90
Sexual concerns	3.23 (3.35)	.70
Substance use age 16		
# Cigarettes last 30 days	0.70 (1.47)	.81

Variable	% (<i>n</i>) or <i>M</i> (<i>SD</i>)	EFA Loading
# Times drunk last 30 days	0.47 (0.90)	.80
# Marijuana last 30 days	0.53 (1.21)	.74
Other illegal drug last year	4.5% (26)	.60

Note. EFA = exploratory factor analysis. For trauma symptoms and substance use categories, loadings reported are for each latent variable, respectively.

Table 2.
Mediation Model of Potential Mediators Linking Maltreatment to Four or More Sexual Partners.

Mediator	Pred → Med <i>a</i>	Med → Out <i>b</i>	Direct <i>c</i>	Mediated <i>c'</i>	Indirect Effect	κ^2
Maltreatment					Point Estimate (CI)	
Physical abuse			.33 (.21)	.28 (.22)		
Trauma symptoms	.05 (.10)	.08 (.10)			.0043 [−.0094, .0678]	.004
Substance use	.11 (.10)	.60 (.10) ***			.0644 [−.0535, .2163]	.066
General effects					.0687 [−.0546, .2285]	
Emotional maltreatment			.20 (.20)	.10 (.21)		
Trauma symptoms	.28 (.10) ***	.08 (.10)			.0224 [−.0287, .0304]	.022
Substance use	.15 (.10)	.60 (.10) ***			.0885 [−.0426, .0961]	.087
General effects					.1109 [−.0272, .2650]	
Sexual abuse			.31 (.22)	.41 (.23)		
Trauma symptoms	.22 (.10) *	.08 (.10)			.0175 [−.0169, .1080]	.018
Substance use	−.13 (.11)	.60 (.10) ***			−.0804 [−.2292, .0398]	.078
General effects					−.0629 [−.2261, .0802]	
Neglect			.01 (.21)	.02 (.22)		
Trauma symptoms	.01 (.10)	.08 (.10)			.0013 [−.0171, .0322]	.001
Substance use	−.03 (.10)	.60 (.10) ***			−.0154 [−.1684, .1041]	.014
General effects					−.0141 [−.1664, .1087]	

Note. CI = 95% confidence interval; κ^2 = kappa squared. Analyses included the following control variables: site, race, and gender. Estimates of indirect effects derived from Preacher and Hayes' (2008) multiple mediator models. Bias corrected, using 5000 resamples.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3.
Mediation Model of Proposed Intervening Variables Linking Maltreatment to Low Sexual Self-Efficacy.

Mediator	Pred → Med a	Med → Out b	Direct c	Mediated c'	Indirect Effect	κ^2
Maltreatment					Point Estimate (CI)	
Physical abuse			.16 (.32)	.13 (.32)		
Trauma symptoms	.05 (.10)	.23 (.13)			.0123 [-.0258, .0911]	.012
Substance use	.11 (.10)	.22 (.12)			.0245 [-.0113, .1249]	.026
General effects					.0368 [-.0317, .1496]	
Emotional maltreatment			-.02 (.31)	-.12 (.32)		
Trauma symptoms	.28 (.09)**	.23 (.13)			.0639 [.0036, .1829]*	.065
Substance use	.15 (.10)	.22 (.12)			.0343 [-.0079, .1333]	.035
General effects					.0983 [.0161, .2187]**	
Sexual abuse			.00 (.33)	.00 (.34)		
Trauma symptoms	.19 (.10)	.23 (.13)			.0428 [-.0064, .1545]	.041
Substance use	-.14 (.10)	.22 (.12)			-.0301 [-.1284, .0071]	.032
General effects					.0127 [-.0867, .1223]	
Neglect			.44 (.33)	.43 (.33)		
Trauma symptoms	.02 (.10)	.23 (.13)			.0039 [-.0426, .0685]	.004
Substance use	-.02 (.10)	.22 (.12)			-.0045 [-.0657, .0487]	.006
General effects					-.0006 [-.0841, .0819]	

Note. CI = 95% confidence interval; κ^2 = kappa squared. Analyses included the following control variables: site, race, and gender. Estimates of indirect effects derived from Preacher and Hayes' (2008) multiple mediator models. Bias corrected, using 5,000 resamples.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4.
Mediation Model of Proposed Intervening Variables Linking Maltreatment to Unprotected Sex.

Mediator	Pred → Med <i>a</i>	Med → Out <i>b</i>	Direct <i>c</i>	Mediated <i>c'</i>	Indirect Effect	κ^2
Maltreatment					Point Estimate (CI)	
Physical abuse			.15 (.26)	.11 (.27)		
Trauma symptoms	.04 (.10)	.34 (.11)**			.0149 [−.0462, .0938]	.015
Substance use	.10 (.10)	.26 (.10)*			.0270 [−.0188, .1220]	.029
General effects					.0418 [−.0523, .1639]	
Emotional maltreatment			.25 (.26)	.11 (.27)		
Trauma symptoms	.28 (.10)**	.34 (.11)**			.0937 [.0244, .2012]**	.092
Substance use	.14 (.10)	.26 (.10)*			.0386 [−.0118, .1185]	.038
General effects					.1323 [.0363, .2584]**	
Sexual abuse			−.28 (.28)	−.30 (.29)		
Trauma symptoms	.21 (.10)*	.34 (.11)**			.0707 [.0063, .2017]*	.072
Substance use	−.13 (.10)	.26 (.10)*			−.0339 [−.1307, .0124]	.031
General effects					.0367 [−.0759, .1838]	
Neglect			.64 (.28)*	.68 (.29)*		
Trauma symptoms	.01 (.10)	.34 (.11)**			.0047 [−.0485, .0839]	.007
Substance use	−.02 (.10)	.26 (.10)*			−.0050 [−.0750, .0473]	.003
General effects					−.0003 [−.0887, .1072]	

Note. CI = 95% confidence interval; κ^2 = kappa squared. Analyses included the following control variables: site, race, and gender. Estimates of indirect effects derived from Preacher and Hayes' (2008) multiple mediator models. Bias corrected, using 5,000 resamples.

* $p < .05$.

** $p < .01$.

*** $p < .001$.