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## Trajectories of Childhood Sexual Abuse and Early Adolescent HIV/AIDS Risk Behaviors: The Role of Other Maltreatment, Witnessed Violence, and Child Gender

**Deborah J. Jones,**

Department of Psychology, University of North Carolina at Chapel Hill

**Desmond K. Runyan,**

Department of Social Medicine, University of North Carolina at Chapel Hill

**Terri Lewis,**

Collaborative Studies Coordinating Center, University of North Carolina at Chapel Hill

**Alan J. Litrownik,**

Department of Psychology, San Diego State University

**Maureen M. Black,**

Department of Pediatrics, University of Maryland School of Medicine

**Tisha Wiley,**

Juvenile Protective Association, Chicago, IL

**Diana E. English,**

Child Welfare Research Group, Seattle, WA

**Laura J. Proctor,**

Department of Psychology, San Diego State University

**Bobby L. Jones,** and

Department of Public Policy and Statistics, Carnegie Mellon University

**Daniel S. Nagin**

Department of Public Policy and Statistics, Carnegie Mellon University

### Abstract

Childhood sexual abuse (CSA) has been associated with HIV/AIDS risk behavior; however, much of this work is retrospective and focuses on women. The current study used semiparametric mixture modeling with youth ( $n = 844$ ; 48.8% boys) from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) to examine the link between trajectories of CSA (2 to 12 y.o.) and HIV/AIDS risk behavior at age 14 (i.e., sexual intercourse & alcohol use). Trajectory analyses revealed a link between a history of CSA and the development of risky behavior. In addition,

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#### Potential Future Readers of JCCAP

Laura McKee, Ph.D., Postdoctoral Fellow, Department of Psychology, UNC Chapel Hill, CB #3270, Chapel Hill, NC 27599-3270; laura\_mckee@unc.edu

Sarah Shook, Ph.D., Research Assistant Professor, Duke Child and Family Study Center, Duke University Medical Center, 718 Rutherford Street, Durham, NC 27705; sarah.shook@duke.edu

Lynn Martin, M.S. Injury Prevention Research Center, UNC Chapel Hill, 137 East Franklin Street, CB# 7505 Bank of America Plaza, Suite 500 Chapel Hill, NC 27599-7505; lynn\_martin@med.unc.edu

Lisa Pearce, Ph.D., Department of Sociology, UNC Chapel Hill, 155 Hamilton Hall CB#3210 • Chapel Hill, NC 27599-3210; ldpearce@unc.edu

Seth Kalichman, Department of Psychology, University of Connecticut, 406 Babbidge Road, Unit 1020, Storrs, CT 06269-1020; seth.k@uconn.edu

trajectories for physical and emotional abuse, but not neglect or witnessed violence, contributed to risky behavior over and above the role of CSA. Child gender did not moderate the findings. Findings highlight the significance of CSA histories, as well as the broader context of maltreatment, for better understanding the development of risk behaviors in both girls *and* boys.

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Over 5,000 young people (aged 13 to 24) were diagnosed with HIV or AIDS during 2006, the most recent reporting period (i.e., 14% of the persons diagnosed) and 232 youth with AIDS died during the same year (CDC, 2008). In a recent national survey, almost half (48%) of high school students indicated that they had engaged in sexual intercourse, the primary mechanism through which youth contract HIV/AIDS (CDC, 2007). Although the use of substances in general increases the likelihood of engaging in sexual intercourse, alcohol use in particular is problematic for youth due to its relatively wide availability (e.g., Johnston, O'Malley, & Bachman, 2003; SAMSHA, 2004). Alcohol use reduces inhibition, and, in turn, increases the likelihood that youth will engage in sexual intercourse by as much as five-fold (e.g., Hamburger et al., 2008; Leigh & Stall, 1993; Tinsley, Lees, & Sumartojo, 2004). Accordingly, identifying factors that predict the *combination* of alcohol use and sexual intercourse among youth is critical to HIV prevention (e.g., CDC, 2007; Leigh & Stall, 2003).

One well-established risk factor for both alcohol use and sexual behaviors that increase the risk for HIV is childhood sexual abuse (CSA) (Cunningham, Stiffman, Dore, & Earls, 1994; Noll, Trickett, & Putnam, 2008; Rotheraum-Borus, Mahler, Koopman, & Langabeer, 1996; Wilson & Widom, 2008; Wingood & DiClemente, 1998). It has been hypothesized that CSA results in a sense of powerlessness that may undermine the self-efficacy critical to navigating relationships, including sexual relations, increasing the likelihood that alcohol may be used to cope with impending sexual encounters (e.g., Finkelhor & Browne, 1985; Johnsen & Harlow, 1996; Wyatt, 1991). In turn, individuals with sexual abuse histories are overrepresented in statistics on the consequences of risky sexual behavior, including increased rates of HIV (e.g., Anaya, Swendeman, & Rotheram-Borus, 2005; Wilson & Widom, 2008; also see for reviews Arriola, Loudon, Doldren, & Fortenberry, 2005; Koenig & Clark, 2004; Senn et al., 2008; Whitmire, Harlow, Quina, & Morokoff, 1999).

From the perspective of understanding the *development* of behaviors that increase the risk for HIV among sexually abused youth, however, the research is limited in several important ways, with a primary issue across studies the inconsistent measurement of CSA (Feerick, Knutson, Trickett, Flanzer, 2006; Senn et al., 2008; Trickett, 2006). As highlighted elsewhere, studies identifying increased rates of HIV risk behaviors among individuals with a CSA history have largely relied on adult recall of CSA, raising concerns about the reliability of reporting due in part to the potential for recall biases (Barnes, Noll, Putnam, & Trickett, 2009; Maughan & Rutter, 1997; Widom, Raphael, & DuMont, 2004). Thus, it is possible to conclude only that retrospective reports of CSA are associated with HIV and behaviors that increase the risk for HIV, not that CSA increases the vulnerability for adolescent risk behavior, a critical period of risk for HIV infection.

Studies that do not rely on retrospective reports of CSA typically utilize child protective service (CPS) records to determine whether abuse occurred (i.e., a substantiated report) and then follow single incidents of substantiated cases of CSA forward into adolescence or young adulthood (Widom & Kuhns, 1996; Widom, White, Czaja, & Marmorstein, 2007; Wilson & Widom, 2008; see Margolin & Gordis, 2000 for a review). Although this approach avoids the problem of recall bias, it fails to examine whether CSA is a chronic rather than a circumscribed event, whether it is more or less likely to occur at certain ages, and whether individual developmental trajectories or histories of CSA uniquely predict better or worse outcomes (Noll, Trickett, & Putnam, 2003; Trickett, Reiffman, Horowitz, &

Putnam, 1997; Senn et al., 2008). A narrow focus on substantiated CPS cases to infer CSA also ignores recent empirical findings that suggest unsubstantiated reports of CSA are likely to be reliable indicators of abuse experiences (Hussey et al., 2005; Kohl, Jonson-Reid, & Drake, 2009; Senn et al., 2008).

In addition, much of the work on CSA and risky behavior has focused on females, with far less attention on males (Brown et al., 2000; Cunningham et al., 1994; Hein et al., 1995; Noll, Trickett, & Putnam, 2003; Wilson & Widom, 2008). It is true that females experience higher rates of CSA than males (i.e., 30% vs. 15% for lifetime prevalence rates self-reported among adults). When males are included evidence to date suggests elevated rates of HIV risk behaviors in both males and females (Senn et al., 2008; van Roode, Dickson, Herbison, & Paul, 2009); although some work suggests that the associations may be stronger or more consistent for women (Widom et al., 2007; Wilson & Widom, 2008). Still little is known about whether there are differences in the *development* of behaviors that increase the risk for HIV in boys *and* girls with CSA histories.

Finally, relatively little research on CSA and HIV risk behavior takes into account exposure to other types of maltreatment or witnessed violence (Margolin & Gordis, 2000; Senn et al., 2008). Children who are maltreated often experience multiple types of maltreatment and are also more likely to be exposed to violence in their home and community (e.g., Finkelhor, Turner, Ormrod, Hamby, & Kracke, 2009; Kellogg & Menard, 2003; Lynch & Cicchetti, 1998). In addition, other types of maltreatment and witnessed violence have been linked to risky behavior (Black et al., 2009; Deblinger, McLeer, Atkins, Ralphe, & Foa, 1989; Elliott et al., 2002; Merrick et al., 2008; Taylor & Kliwer, 2006; Van Brunschot & Brannigan, 2002; Voisin, 2005). When studies of CSA do include other types of maltreatment or witnessed violence, however, these experiences are often examined in separate models or used as multiple indicators of a single child maltreatment construct (e.g., Black et al., 2009; Widom, White, Czaja, & Marmorstein, 2007); thus, little is known about whether such experiences increase adolescent vulnerability for HIV risk behavior over and above the more established effects of CSA.

In light of the aforementioned limitations, the current study utilized advances in semiparametric mixture modeling methods to accomplish the following three aims: 1). to examine the link between the trajectories of CSA and the combination of two behaviors that increase the risk for HIV, alcohol use and sexual intercourse, in a high-risk sample of youth using a prospective longitudinal design; 2). to determine whether trajectories of other types of maltreatment or witnessed violence contribute to HIV risk behavior over and above, or in combination with, CSA; and 3). to examine the role of child gender in the associations between CSA, other maltreatment or witnessed violence, and HIV risk behaviors. From the numerous studies that have linked CSA to risky behavior, it was expected youth in a trajectory group characterized by relatively higher rates and/or more chronic CSA would be more likely to engage in HIV risk behaviors in adolescence. In addition, it was expected that the trajectories for other types of maltreatment and witnessed violence would each uniquely contribute to HIV/AIDS risk behaviors over and above the effect of CSA, or *exacerbate the effect of CSA*. Finally, although it was expected that boys would be more likely to endorse alcohol use and sexual intercourse than girls, prior work (Senn et al., 2008) suggested that there would not be gender differences in the pattern of the associations between the trajectories and risky behaviors.

## Method

### Overview

Data for the current study were drawn from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), a prospective longitudinal study assessing the antecedents and consequences of child abuse and neglect. LONGSCAN is comprised of a coordinating center, located at the University of North Carolina at Chapel Hill, and five sites including three urban sites, one suburban site, and one statewide site. All sites use common protocols which are approved by the local Institutional Review Boards. Each site includes a sample of participants recruited at age 4 or younger and represents a continuum of risk from children removed from their homes prior to age 4 due to substantiated maltreatment to those at-risk for maltreatment. Separate in-person interviews are conducted with children and their primary caretakers beginning at age 4 (baseline sample = 1,354), with ongoing data collected at approximately ages 6, 8, 12, 14, 16, and 18. In addition to in-person interviews, telephone interviews are conducted during odd years between 4 and 18 as well as at age 10.

### Participants

Participants included in the current analyses were those children who had complete maltreatment and witnessed violence data from at least three time points across childhood, as well as complete data for the alcohol use and sexual intercourse outcome variables at the age 14 interview. Age 14 was the first time point at which both alcohol use and sexual behavior were assessed ( $n = 844$ ) and an age that has been identified as a risky developmental period for both alcohol use and sexual intercourse (e.g., NIAAA, 2003; US DHHS, 2007; Zimmer-Gembeck & Helfand, 2008).

Analyses comparing those youth in the analysis subsample to the LONGSCAN youth with incomplete data revealed no statistically significant differences between the two groups on any demographic variables (e.g., gender), site, or maltreatment status at age 4, with the exception of ethnicity. The analysis sample had a lower percentage (18%) of youth categorized as 'Other' Race than the sample with incomplete data (24%) ( $\chi^2 = 7.62, p < .01$ ).

Examination of demographic variables at age 14, revealed that on average youth were 14.4 years old ( $SD = 0.5$ ), approximately half (51.2%) were girls, and approximately half (54.7%) were African American (27% Caucasian; 18.3% Other). On average, caregivers had 12.6 years of education ( $SD = 2.2$ ). The percentage of participants from each of the five sites was approximately equal, ranging from 18.1 to 24.4.

### Procedure

All interviews were conducted by project-trained interviewers after consent was obtained from the primary caregivers. The interviews were approximately 2 hours in duration, after which caregivers and children were compensated for their time (\$20 to \$40 per interview depending on the site). Children were included in data collection as early as the age 4 interviews; with increasing inclusion of self-report measures as the children aged. Beginning at age 12, children and caregivers were interviewed using an audio-computer assisted self-interview (A-CASI), a program which reads the self-report questions aloud and allows participants to select the response that corresponds to their answer, maximizing confidentiality and reducing the potential for biased responses.

Maltreatment data were collected from lifetime reviews of CPS records, which were collected and coded on regular intervals at each site. Telephone interviews allowed the sites to track families and assess a range of psychosocial measures in years when there was not a

face-to-face interview (for a more complete description of LONGSCAN, see Runyan et al., 1998).

## Measures

**CSA and other maltreatment**—Official CPS records, including both allegations and substantiations, of child maltreatment were coded using a LONGSCAN modified version of Barnett et al.'s (1993) Maltreatment Classification System (*MMCS*; English & the LONGSCAN Investigators, 1997; as modified from Barnett, Manly & Cicchetti, 1993). Narrative reports made to CPS for child maltreatment from birth to age 12 years were reviewed, abstracted, and coded at each of the LONGSCAN sites. Each report was coded by type: sexual abuse, physical abuse, neglect (failure to provide and/or lack of supervision), and emotional abuse. The MMCS has been used extensively in coding maltreatment data across studies and is accepted as a reliable classification of maltreatment experiences based on CPS records (e.g., Dubowitz, Pitts, Litrownik, Cox, Runyan, & Black, 2005; English, Graham, Litrownik, Everson, & Bangdiwala, 2005; Litrownik, Lau, English, Briggs, Newton, Romney, & Dubowitz, 2005). LONGSCAN coders across sites were trained to 90% agreement with a gold standard coder, and a subsequent reliability assessment utilizing a sample of reports from all the sites indicated good overall agreement on the coding of type (all kappas > .7). Prior work with LONGSCAN data (Hussey et al., 2005), as well as other reports (e.g., Kohl, Jonson-Reid, & Drake, 2009; also see Senn et al., 2008 for a review), suggesting that outcomes do not differ when using allegations or substantiations, and in fact, allegations may be a better indicator of actual experience. Based on these findings, maltreatment codes for the current study were used to reflect allegations of abuse (0 = no; 1 = yes) for each 2-year interval. Maltreatment referrals coded as CSA, physical abuse, emotional abuse, and neglect at time periods 0–2, 2–4, 4–6, 6–8, 8–10, and 10–12 were the focus of the current study.

**Witnessed violence**—Primary caregiver report of child exposure to violence in the home or community was assessed at ages 4, 6, 8, 10, and 12 using the Child Life Events Scale (modified from Coddington, 1972), which provides information about major life events (such as deaths or accidents) that occurred in the child's life during the past year. LONGSCAN researchers modified the scale to include items that were expected to occur with more frequency in lower income samples (e.g., homelessness). Items incorporated as indices of witnessed violence included "Child was in court as a witness to a crime," "Child witnessed someone hit, kicked, or physically harmed," "Child saw someone shot or stabbed," "Child saw someone killed," "Child witnessed loud arguments," "Child witnessed someone physically threatened with a weapon", and "Child saw someone sexual abused, assaulted, or raped". Witnessed violence scores at each assessment were calculated as a sum of the number of specific items endorsed (range = 0 to 7), with higher scores indicating greater exposure to violence.

**Risky behavior**—At the age 14 A-CASI interview, adolescents reported on their history of alcohol use and sexual intercourse. Of note, early alcohol use defined elsewhere as ranging from 9 to 15 years of age (e.g., NIAAA, 2003; US DHHS, 2007), as well as use by middle school age adolescents (which includes 14 y.o.), is considered particularly problematic because it is associated with later use, problem use, and associated consequences (e.g., D'Amico & McCarthy, 2006; Johnston et al., 2005; Simoes et al., 2008). For the current study, the item on alcohol use was taken from the Alcohol Module of the Computerized Diagnostic Interview Schedule for Children (C-DISC; Shaffer et al., 2000). The question was preceded by the instruction "The next questions are about your use of alcohol - beer, wine, wine coolers, or hard liquors like vodka, gin, or whiskey. Each can or bottle of beer, glass of wine or wine cooler, shots of liquor, or mixed drink with liquor in it

counts as one drink". Then, youth were asked "Not including sips from another person's drink, have you ever, in your whole life, even once, had a drink?" Of note, assessment of lifetime use is not uncommon in the literature, given the relatively low rates of use by most youth, even in high-risk samples (e.g., Schofield et al., 2008; Mrug & Windle, 2009; Taylor & Kliewer, 2006).

The item assessing sexual intercourse ("Have you ever had sex?") was taken from the Adolescent Sexual Experiences Measure (Knight et al., 2008)<sup>1</sup>. This item was introduced by a statement defining sex as sexual intercourse. Of note, qualitative analyses in prior work suggest that youth interpret this question as indicating vaginal intercourse (Stanton et al., 1995). Although the specific cut-point at which the initiation of sexual intercourse is considered particularly risky typically ranges from 13 to 15 y.o. (or younger), having engaged in sexual intercourse by age 14 has been identified as "early initiation" and, therefore, by definition any sex in this age range has been considered risky (e.g., Schofield, Bierman, Heinrichs, Nix, & the Conduct Problems Prevention Research Group, 2008; Wilson & Widom, 2008; Zimmer-Gembeck & Helfand, 2008).

Both theory (e.g., Jessor & Jessor, 1977; Jessor et al., 1995) and research (e.g., Halpern-Felsher, Millstein, & Ellen, 1996; Zimmer-Gembeck et al., 2008) highlight the covariation of alcohol use and sexual intercourse, particularly in this age group. Given this covariation and the link between these two behaviors and the risk for HIV (e.g., CDC, 2007; Leigh & Stall, 2003), the two items were summed to create an index of increasing risk (0 = never engaged in either behavior; 1 = engaged in alcohol use or sexual intercourse; 2 = engaged in both alcohol use and sexual intercourse).

## Results

### Preliminary Analyses

Given that relatively little attention has been devoted to boys in the CSA and risky behavior literature, descriptive analyses were conducted to examine whether the primary study variables varied by child gender. Analyses revealed that boys (24.5%) were not more likely than girls (27%) to endorse alcohol use ( $\chi = .55$ , *n.s.*); however, boys (26%) were more likely than girls (15.8%) to report having engaged in sexual intercourse ( $\chi = 11.8$ ,  $p < .001$ ).

With regard to lifetime allegations (through age 12) of each of the types of maltreatment, there was a trend toward boys (35.5%) being more likely than girls (29.1%) to have at least one allegation of physical abuse ( $\chi = 3.57$ ,  $p = .06$ ). In contrast, girls (18.8%) were more likely than boys (9.9%) to have at least one allegation of CSA ( $\chi^2 = 12.7$ ,  $p < .001$ ). Lifetime allegations of neglect (58.4% boys; 56.1% girls;  $\chi^2 = .35$ , *n.s.*), emotional abuse (32% boys; 33.6% girls;  $\chi^2 = .16$ , *n.s.*), and witnessed violence (76.4% girls; 72.2% boys;  $\chi^2 = 1.68$ , *n.s.*) did not differ by gender.

### Identification of Trajectories

Then, developmental trajectories for CSA, physical abuse, emotional abuse, neglect, and witnessed violence were estimated using group-based trajectory modeling (PROC TRAJ; Jones, Nagin, & Roeder, 2001; Nagin, 1999; Nagin, 2005). Given the previously described

<sup>1</sup>The wording of the sexual intercourse item did not explicitly ask youth to exclude penetration that occurred in the context of the CSA experience; however, review of the CPS records suggest that only one of the youth whose CSA allegation included penetration endorsed sexual intercourse at age 14. In addition, we conducted a chi-square analyses within the youth who have a history of a CSA allegations and compared youth who ever had an allegation(s) that included penetration versus those whose allegation(s) never included penetration on their response to the sexual intercourse item at age 14. The chi-square was not significant.

differences in recruitment strategies by site, site was entered into the trajectory analyses as a covariate. The zero-inflated Poisson (ZIP) model, useful events or experiences to which a relatively small percentage of the population is exposed was used to model the trajectories of witnessed violence (Jones, Nagin, & Roeder, 2001). The logistic (LOGIT) model, used to model the conditional distribution of dichotomous data given group membership, was utilized to calculate the trajectories for the maltreatment variables (i.e., presence or absence of CPS allegation at each time point). For each child, the model's coefficient estimates were used to calculate the probability that the child belongs to each group. Following the recommendations of Nagin et al. (e.g., Jones, Nagin, & Roeder, 2001; Nagin, 1999; Nagin, 2005), the model with the fewest groups and the largest Bayesian Information Criterion (BIC) was selected.

Given the relative exclusion of boys from research on sexual abuse and risky behaviors, as well as the previously noted gender differences on some of the maltreatment and witnessed violence variables, trajectory analyses were first conducted separately by gender. However, the key outputs for the trajectory analyses (i.e., shape of trajectory; proportion of population belonging to each trajectory; posterior probability; and the shape of the model with the maximized BIC) were not significantly different for girls and boys. Therefore, trajectory analyses are presented for both girls and boys combined for each of the maltreatment and witnessed violence experiences.

A two-group model yielded the maximum BIC (i.e., least negative) for both CSA (BIC = -378.44) and physical abuse (BIC = -930.68). For CSA, inspection of Figure 1 reveals that the two trajectories for sexual abuse are characterized by the "no allegations" trajectory reflecting youth for whom there was no allegation of CSA across childhood (85.6% of the sample). After accounting for the youth who had no allegations of CSA, the remaining youth were best described by a single trajectory which can be characterized as "curvilinear", with the highest level of allegations of CSA occurring between ages 4 and 8, and lower levels of allegations of CSA occurring both at relatively younger and older ages (14.4%).

As demonstrated in Figure 2, the first trajectory for physical abuse is also characterized by a "no allegations" group, representing approximately 67.8% of the sample. In addition, the best fitting model suggested that the remaining youth could best be characterized by a second group, "high-level remits" (32.2%). Essentially, youth for whom any allegations of PA were made during childhood had histories characterized by a higher level of physical abuse allegations when they were younger, then declining allegations as the children age.

For emotional abuse (BIC = -904.41), neglect (BIC = -1561.70) and witnessed violence (BIC = -4267.07) the BIC was maximized for the 3 group model. For emotional abuse and neglect, Figures 3 and 4 reveal 3 trajectories: a "no allegations" trajectory (67.2% of the sample for emotional abuse; 42.8% for neglect), a "high-level remit" trajectory (9.3% of the sample for emotional abuse; 28.6% for neglect), and a "low-chronic" trajectory (23.5% of the sample for emotional abuse; 28.6% for neglect), reflecting youth who have reports of EA or N, respectively, which begin at relatively young ages and persist at similar levels throughout childhood.

Finally, Figure 5 depicts the 3 trajectories for witnessed violence: "no allegation" (17.5% of the sample), "low-chronic" (58.4% of the sample), and "high-chronic" (24.1%), characterizing youth who experience relatively higher levels of caregiver-reported witnessed violence throughout childhood.

### Overlap of CSA Groups with Other Maltreatment/ Witnessed Violence Groups

Given that a primary focus of the study was to determine whether other maltreatment or witnessed violence contributed to risky behavior over and above CSA (or in combination with) CSA, it was necessary to examine the degree of overlap of the CSA groups with the other maltreatment and witnessed violence groups. Accordingly, the percentage of individuals in each of the groups defined by CSA who are also members of the other maltreatment and witnessed violence groups was examined (note: overlap among other trajectories are presented as well). As demonstrated in Table 1, examination of the percentage of overlap between CSA trajectories and the other maltreatment and witnessed violence trajectories reveals that youth in the curvilinear CSA trajectory are also more likely to be in the group that reflected either a higher or more chronic trajectory on each of the other types of maltreatment and witnessed violence experiences. However, inspection of Table 1 also reveals that although there is overlap, the overlap is not near 100%. Accordingly, analyses examining the explanatory power of CSA, other maltreatment, and witnessed violence for risk behaviors could be conducted.

### Explanatory Power of the CSA, Other Maltreatment, and Witnessed Violence Trajectories

While this study uses a large sample size of high-risk youth, it was not feasible to make meaningful statistical contrasts of non-overlapping groups, due to the relatively small sizes of these groups (e.g., youth who were in the “no allegations” group for sexual abuse but not physical abuse vs. youth who are in the “no allegations” group for physical abuse but not sexual abuse). Such comparisons also treat the group designations as unambiguous designations, rather than as approximations based on the estimated group membership probabilities. In turn, the inherent uncertainty in classification can significantly undermine inference based on conventional methods of statistical inference that assume no classification error (Nagin & Tremblay, 1999; Roeder et al., 1999).

Because the outcome variable was ordinal, the models were estimated using multinomial regression analyses. Given that site was statistically controlled in the trajectory analyses, site was not entered into the regression model. First, child gender was entered in the model in the first block given the previously reported gender differences on one of the risky behaviors included in the index. Second, the trajectory groups for CSA were entered to examine the link between CSA up through age 12 and the development of HIV/AIDS risk behavior (Model 1). Third, the other maltreatment or witnessed violence trajectories were entered (each in separate models to preserve statistical power) to determine whether each type of witnessed violence contributed to HIV/AIDS risk behavior over and above CSA (i.e., physical abuse in Model 2; emotional abuse in Model 3; neglect in Model 4; and witnessed violence in Model 5). In the fourth and final block, the interaction of the CSA trajectory groups x child gender and the interaction of the CSA trajectory groups x the respective type of other maltreatment or witnessed violence trajectory groups were entered. Importantly, analyses revealed that neither the CSA x child gender interaction nor any of the CSA x other maltreatment/witnessed violence interaction were statistically significant; therefore, the results are not presented here.

Results are reported in Table 2. Consistent with the preliminary analyses, Model 1 shows that girls were less likely than boys to report both alcohol use and sexual intercourse. In addition, CSA increased the likelihood that adolescents would report either or both risk behaviors relative to none, when no other maltreatment or witnessed violence experiences were entered in the model. Youth in the curvilinear CSA trajectory were more likely to report engaging in *either* or *both* alcohol use and sexual intercourse at age 14 than engaging in neither behavior compared to youth in the no allegations CSA trajectory<sup>2</sup>.



After controlling for the role of child gender and CSA, the addition of the physical abuse trajectory groups ( Model 2) contributed additional explanatory power to the model. Although physical abuse did not increase the likelihood that youth would engage in *either* alcohol use or sexual intercourse, youth in the high-remit trajectory were more likely to endorse engaging in *both* behaviors relative to youth in the no allegations trajectory.

After controlling for gender and CSA, the addition of emotional abuse (Model 3) to the model also contributed additional explanatory power. Emotional abuse increased the likelihood that youth would endorse *both* alcohol use and sexual intercourse, but not *either* one alone. That is, youth in the high-remit (but not low-chronic) group were more likely to report engaging in *both* alcohol use and sexual intercourse than youth in the no allegations group.

In contrast to Models 2 and 3, neither the addition of the neglect trajectory groups (Model 4) nor the witnessed violence trajectory groups (Model 5) contributed significant explanatory power to the original model (i.e., gender & CSA)

## Discussion

The current study examined the link between trajectories of CSA, alone and in combination with other trajectories of maltreatment and witnessed violence, and the combination of two behaviors that increase risk for HIV (i.e., alcohol use and sexual intercourse) in a high-risk sample of both boys and girls. A history of CSA was linked to the initiation of behaviors that increase the risk for HIV; however, findings revealed that other maltreatment experiences (i.e., physical & emotional abuse) contributed the development of HIV/AIDS risk behavior over and above CSA. In addition, findings revealed that although boys may be more likely to report engaging in risky behaviors, the association between maltreatment/ witnessed violence trajectories and HIV risk behaviors were not moderated by child gender.

It was predicted that there would be more heterogeneity in the CSA experiences of youth, yielding trajectories defined by frequency and/or chronicity of CSA, particularly given that allegations rather than confirmed cases were examined. Rather, only two CSA trajectories emerged from the data, one for the youth with a history of a CSA allegation and one for the youth with no history of a CSA allegation. Such results suggest a relative lack of heterogeneity in the chronicity and/or frequency of CSA (or at least allegations) in the youth with CSA histories in this sample. In spite of the lack of heterogeneity, youth who were reported to have a sexual abuse history, which in the current sample was characterized as curvilinear (i.e., less likely to occur at early and later childhood and more likely to occur in middle childhood), were at greater risk for engaging in *both* alcohol use and sexual intercourse, or *either* behavior alone, than youth who had no allegations of CSA over the course of childhood. Future research focusing on youth with more heterogeneity in the chronicity and/or frequency of the CSA histories will be necessary to determine whether more chronic/frequent CSA experiences heighten the vulnerability with later risky behaviors. Importantly, similar trajectories characterized both boys' and girls' CSA experiences and child gender did not moderate the link between CSA and risky behavior. Building upon relatively recent secondary HIV prevention research targeting both men and women with HIV who have CSA histories (Sikkema et al., 2007; Sikkema et al., 2008), future work will be necessary to determine whether targeting both boys and girls with CSA

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<sup>2</sup>Although the aim of the current study was to replicate and extend prior work by examining prospective associations between CSA history and risky behavior in adolescence, the case could be made that new allegations of CSA at the age 14 interview had a more salient impact on risky behavior at the same time point. In addition to the problem of disentangling the directionality of the associations between CSA and risky behavior at age 14, only 4 youth in the CSA group had an additional CSA allegation at age 14, decreasing the likelihood that the obtained association is better accounted for by CSA at age 14.

histories for HIV prevention programming will be a successful strategy for preventing transmission of the disease.

This study also extended the research on CSA and HIV risk behaviors by examining the broader context of maltreatment and witnessed violence in which CSA often occurs. Consistent with prior research, findings revealed that youth who experienced CSA were more likely to experience other types of maltreatment and witnessed violence as well (i.e. youth in the curvilinear CSA trajectory group were less likely to fall in the no allegations groups on the other types of maltreatment and witnessed violence than in the high-level remit or chronic groups). However, the findings also revealed that the overlap was not perfect and other types of maltreatment, particularly physical and emotional abuse, contributed to HIV risk behavior over and above CSA. Youth in the high-remit physical abuse trajectory group were more likely to endorse engaging in the combination of *both* risky behaviors relative to youth in the no allegations of physical abuse trajectory group. Similarly, emotional abuse also contributed to risky behavior over and above the contribution of CSA. Youth in the high-remit (but not low-chronic) trajectory group were more likely to report engaging in *both* alcohol use and sexual intercourse (but not either one alone) than youth in the no allegations of emotional abuse trajectory group. Relatively less research has examined physical abuse or emotional abuse as predictors of risky behavior, particularly in youth (Black et al., 2009; Deblinger, McLeer, Atkins, Raphe, & Foa, 1989; Elliott et al., 2002; Merrick et al., 2008; Voisin, 2005). However, the current findings build upon prior work to suggest a particular role for interventions to address physical and emotional abuse in HIV prevention efforts for youth with CSA histories.

Neither the neglect nor witnessed violence trajectory groups contributed unique variance over and above the effect of CSA in the current study. Some prior research has linked women's report of childhood neglect with current involvement in HIV/AIDS risk behaviors (e.g., Hugh et al., 2007; Van Brunschot & Brannigan, 2002; Widom, White, Czaja, & Marmorstein, 2007); however, this study was specifically interested in whether neglect contributed to the development of risky behavior in adolescents over and above the effect of CSA. Although our findings suggest that the overlap between CSA and neglect is certainly not 100%, it may be the case that in prior research those individuals who reported higher levels of neglect also had CSA histories that were not accounted for in the statistical analyses. Similarly, prior work, including work with youth, has also identified both family and community violence as correlates of risky behavior (e.g., Voisin et al., 2004; Voisin et al., 2005). Again, however, methodological differences between prior work and the current study may explain the different pattern of findings. Youth in the Voisin (2005) study were older (*M* age = 16.5 y.o.; Range 14 to 19 y.o.), suggesting that the link Voisin (2005) found between violence and risk behaviors may have been due to higher rates of risk behaviors reported. In addition, prior work has largely limited samples to sexually active youth (e.g., Voisin et al., 2005), while the current study utilized multinomial regression analyses so that the outcome variable could capture variable levels of risk, including youth who have not engaged in any risk behavior. Although both approaches are valid, HIV prevention depends, at least in part, on identifying vulnerable youth prior to their engagement in risky behaviors. Finally, prior work has been largely retrospective and based entirely on adolescent report of their history of abuse and witnessed violence at a single time point, as well as their current risk behavior (e.g., Elliott et al., 2002; Voisin et al., 2003). In order to avoid the potential inflation of the association between history of maltreatment (or witnessed violence) and risky behavior, this study utilized CPS allegations of maltreatment and caregiver report of witnessed violence through age 12 and adolescent-report of risky behavior at age 14. Although beyond the scope of the current analyses, future work should consider whether variation in reporter changes the pattern of associations between maltreatment/witnessed violence trajectory groups and risky behavior outcomes.

As previously noted, boys have been largely excluded from the literature on CSA and risky behavior (Senn et al., 2008); however, the current findings suggest that similar maltreatment experiences predict the development of HIV/AIDS risk behaviors for both boys and girls. Of the few prior studies that include males, gender differences in the link between CSA and risky behavior have not been examined or the findings suggest that males and females are similarly at risk (e.g., Senn et al., 2008; van Roode et al., 2009); although some prior work does suggest that the pattern of risk may be more consistent or robust for adult females than adult males (e.g., Widom, White, Czaja, & Marmorstein, 2007; Wilson & Widom, 2008). Taken together, the current findings suggest that gender may not moderate the link between CSA and risky behavior at age 14 in a sample of youth including both those who have engaged in risky behaviors and those who have not; however, it may be important to consider gender in later adolescence and adulthood when there may be a greater range of risk behaviors (Voisin et al., 2004; Voisin et al., 2005; Widom, White, Czaja, & Marmorstein, 2007; Wilson & Widom, 2008).

CSA group trajectories also did not interact with other types of maltreatment or witnessed violence to predict risky behavior. Accordingly, rather than suggesting that other types of maltreatment or witnessed violence are important to consider because they qualify the impact of CSA on risky behavior, the current findings suggest that other types of maltreatment, namely physical and emotional abuse, contribute over and above CSA to predict risky behavior. Given the relative accumulation of studies devoted to understanding the link between CSA and risky behavior, the current findings suggest that future efforts to identify high-risk youth, including prevention work, should assess both physical and emotional abuse histories as well.

### Limitations and Strengths

As with all research, the current findings must be interpreted in the context of the study limitations. First, the current study examined high-risk youth; therefore, generalizing the findings to youth more broadly should be done with caution. Second, alcohol use and sexual intercourse were examined at only a single time-point, the first time point at which these behaviors were both assessed. Future studies should determine whether specific maltreatment and witnessed violence trajectories predispose youth for specific risky behavior trajectories across adolescence and into adulthood. Third, additional time points will also provide the opportunity to assess a greater degree of variability in the sexual behavior and alcohol use of the youth. Consistent with prior studies of youth in early adolescence, a relative lack of variability in degrees of risky behavior precluded the opportunity to examine more nuanced aspects of sex (e.g., number of partners, condom use) and alcohol use (e.g., amount, frequency). In spite of the relative lack of variability in these outcomes, however, it is important to note that any alcohol use or sex at age 14 have been identified as “risky” behaviors, given their association with other acute and chronic problems for youth. Also important to note, is that it is unlikely that youth in this project interpreted the sexual intercourse item as one that they respond “yes” to if their only experience of penetration occurred during the CSA experience<sup>1</sup>; however, future research should consider explicitly asking youth to exclude CSA experiences when responding to questions about sexual activity so that a greater degree of certainty in the link between CSA and risky behavior can be obtained. Fourth, this study focused on one potential moderator of the trajectories and risky behavior, child gender, and findings did not support gender as a moderator. Other moderators may also be important to consider in future work, such as other child, family, and community risk, as well as protective, factors. Finally, building upon the robust, but largely retrospective or cross-sectional, research highlighting the role of CSA in risky behavior, this study focused on the trajectories of CSA and whether other types of maltreatment contributed to risky behavior over and above or in combination with CSA

(Senn et al., 2008); however, future work should examine the contributions of other multiple subtype occurrences of maltreatment and witnessed violence to risky behavior as well.

Strengths of the study also merit attention. While prior work linking CSA to risky behavior has relied largely on cross-sectional or retrospective designs (Dube, Williamson, Thompson, Felitti, & Anda, 2004; Senn et al., 2008), the current study utilized a prospective design, affording the opportunity to both characterize the patterns of maltreatment and witnessed violence over time, as well as the link between these trajectories and the development of risk behavior in adolescence. In turn, the current analyses provided an opportunity to identify groups within an high-risk sample who may be most vulnerable to risky behavior based on their maltreatment and witnessed violence histories. In addition, the current study examined CSA in the context of other maltreatment and witnessed violence experiences to which youth may be exposed (Finkelhor, Turner, Ormrod, Hamby, & Kracke, 2009). The combination of findings from the analyses examining the overlap between the CSA trajectories and the other types of maltreatment and witnessed violence, in combination with the findings from the regression analyses, suggest that there is overlap in CSA, other maltreatment, and witnessed violence experiences for youth; however, the specific patterns of multiple types of experiences across childhood are clearly important to examine if we are to identify those high-risk youth in greatest need of services. Third, the current study included not only girls, but boys who have been relatively overlooked in the literature linking sexual abuse to risky behavior (Senn et al., 2008). Fourth, confidence in the current findings is strengthened by the use of different sources for each primary study variable, decreasing the likelihood that associations between maltreatment (CPS report), witnessed violence (caregiver report), and adolescent risky behavior (adolescent report) were due to a common reporter. Finally, given discussion elsewhere about the problems associated with the narrow reliance on substantiated cases (Hussey et al., 2005; Kohl, Jonson-Reid, & Drake, 2009; Senn et al., 2008), all allegations of maltreatment were examined.

### **Implications for Future Research, Policy, and Practice**

This study confirms prior primarily retrospective work with adult women demonstrating that CSA is associated with HIV/AIDS risk behavior. Building upon prevention programs targeting adults with HIV and CSA histories (Sikkema et al., 2008), the findings suggest that programs aiming to prevent the development of risky behaviors in youth should target both girls *and* boys with CSA histories. In addition, failing to assess the broader context of maltreatment in which CSA may occur, particularly physical and emotional abuse, may lead to an underestimation of the vulnerability for risky behavior in targeted youth.

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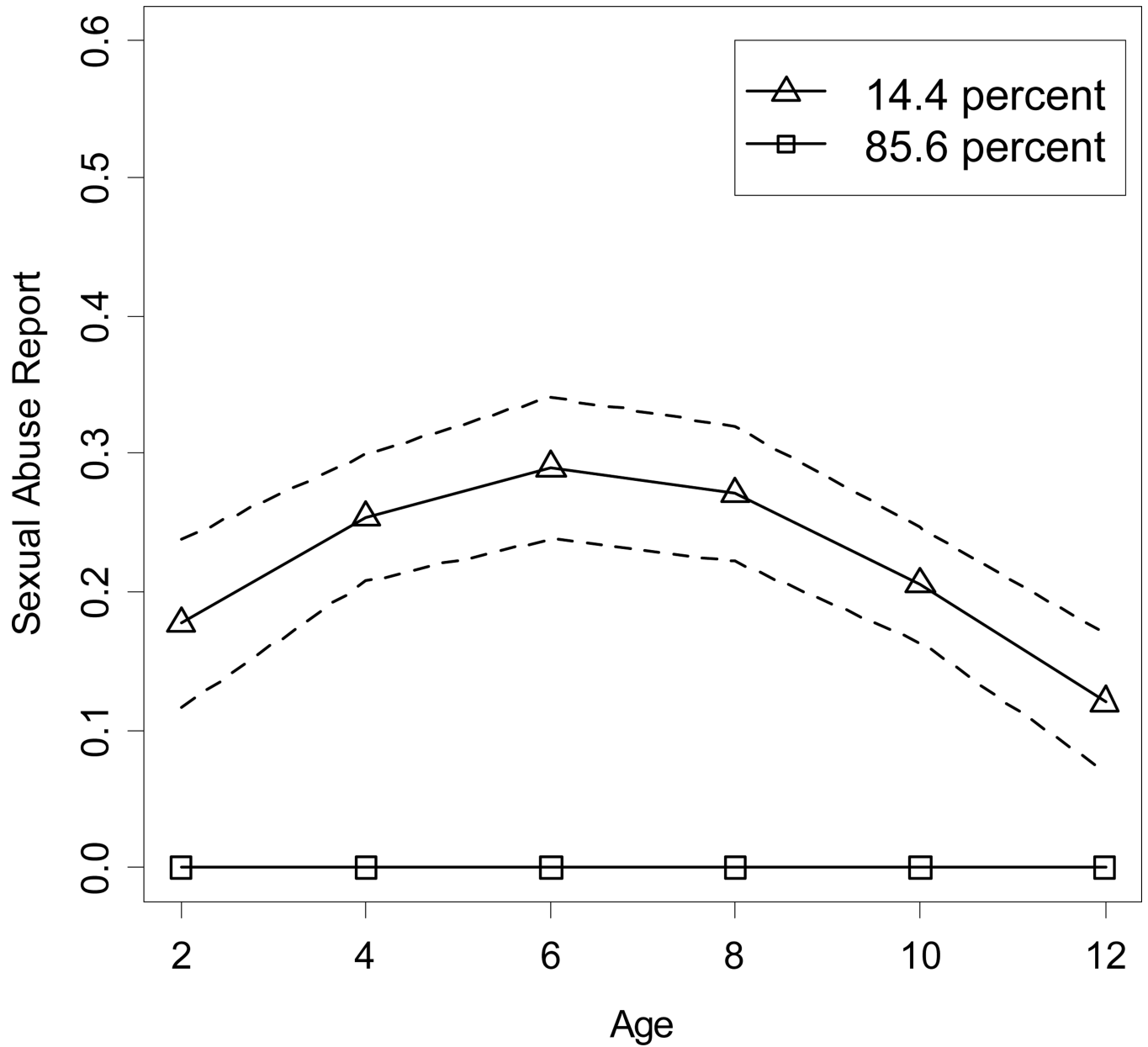
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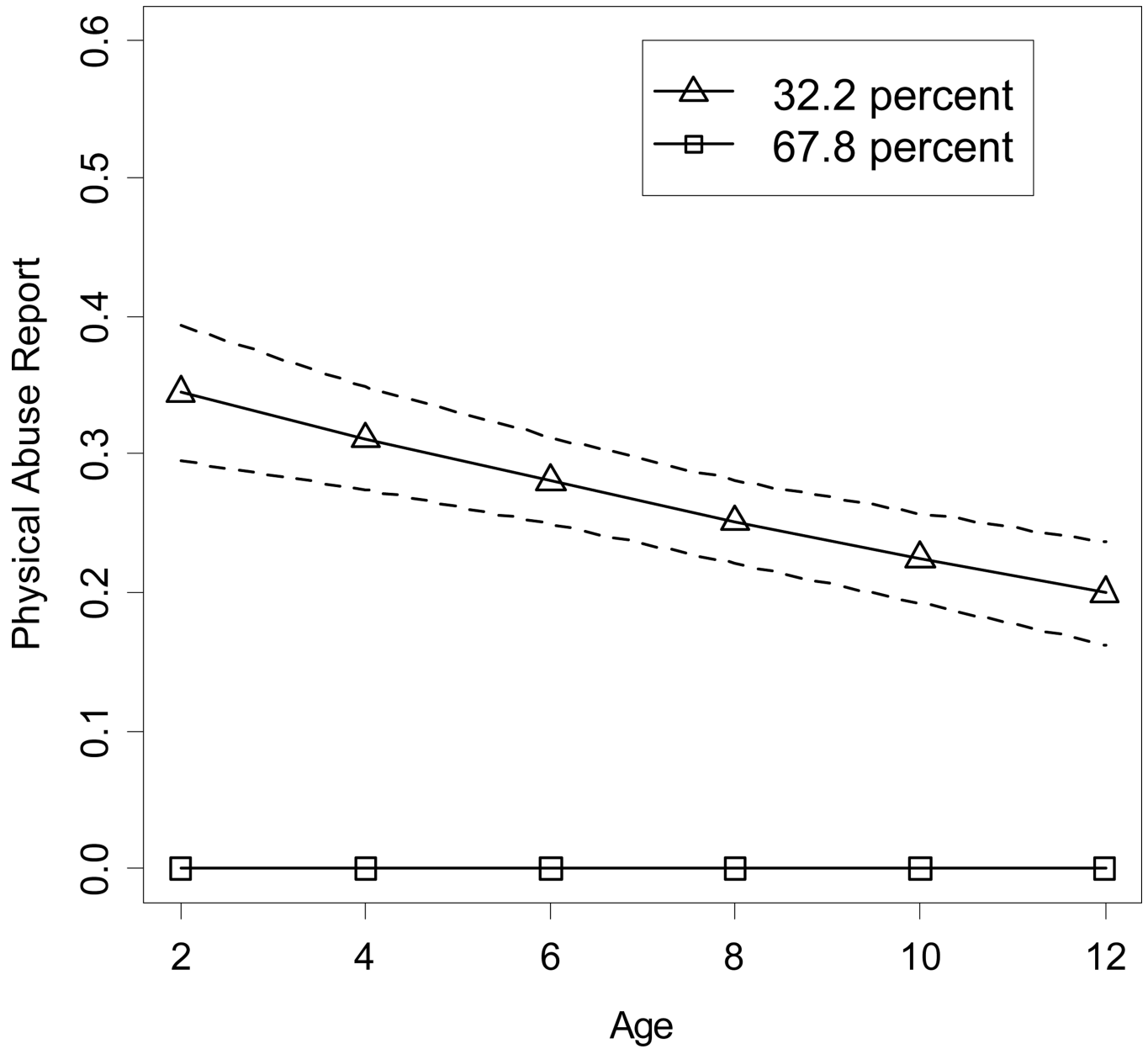
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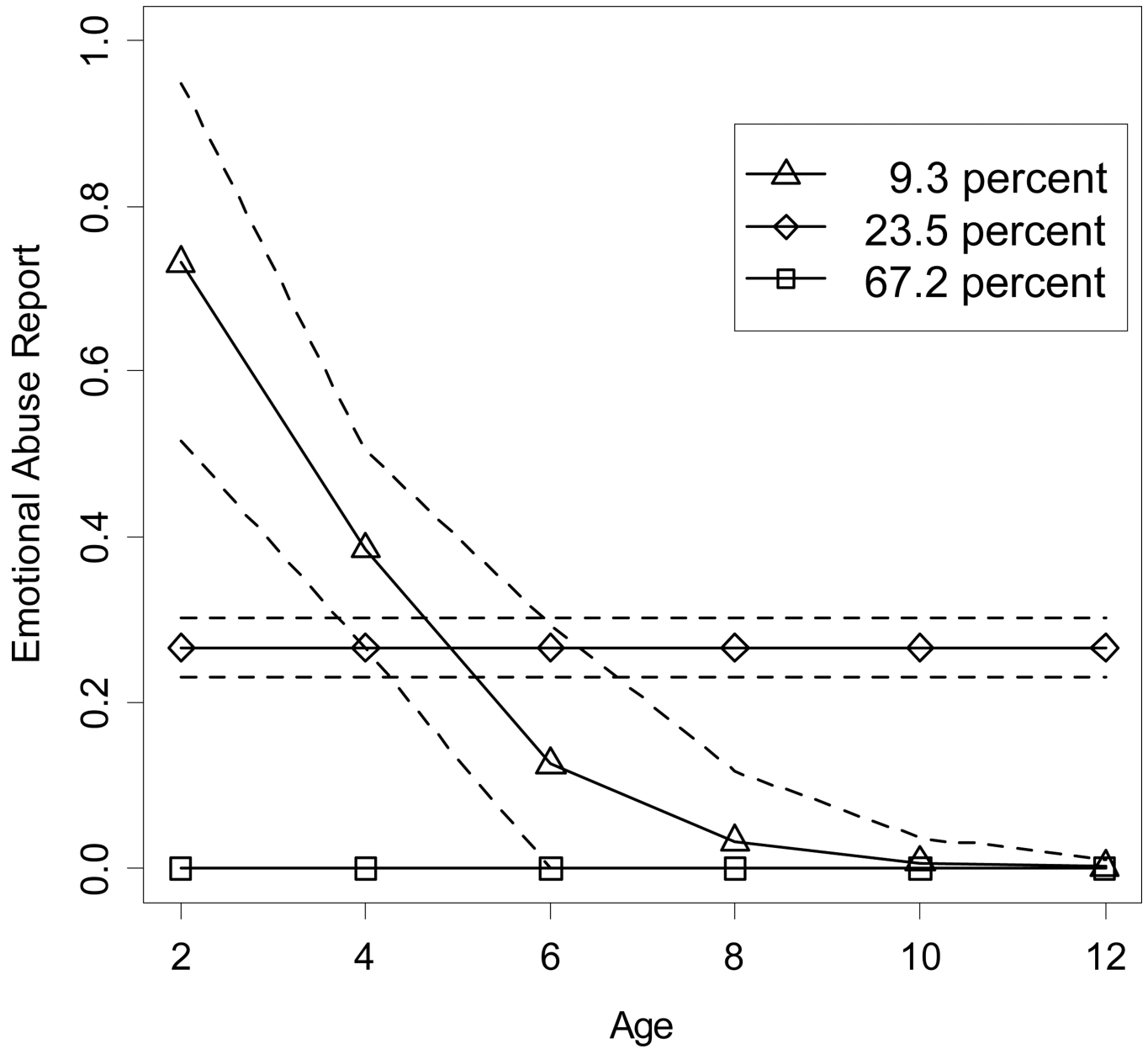




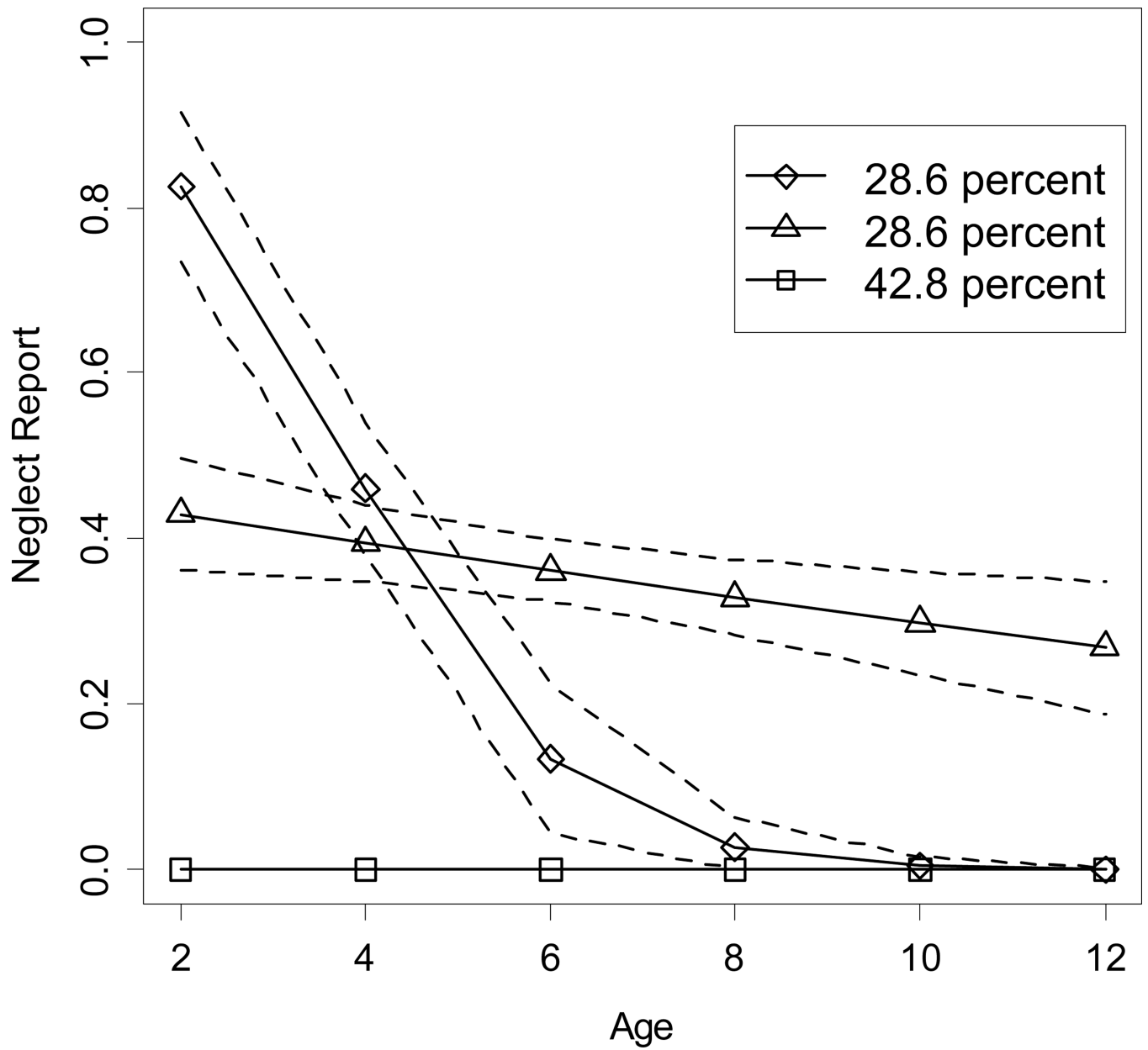
**Figure 1.**  
Trajectories of sexual abuse



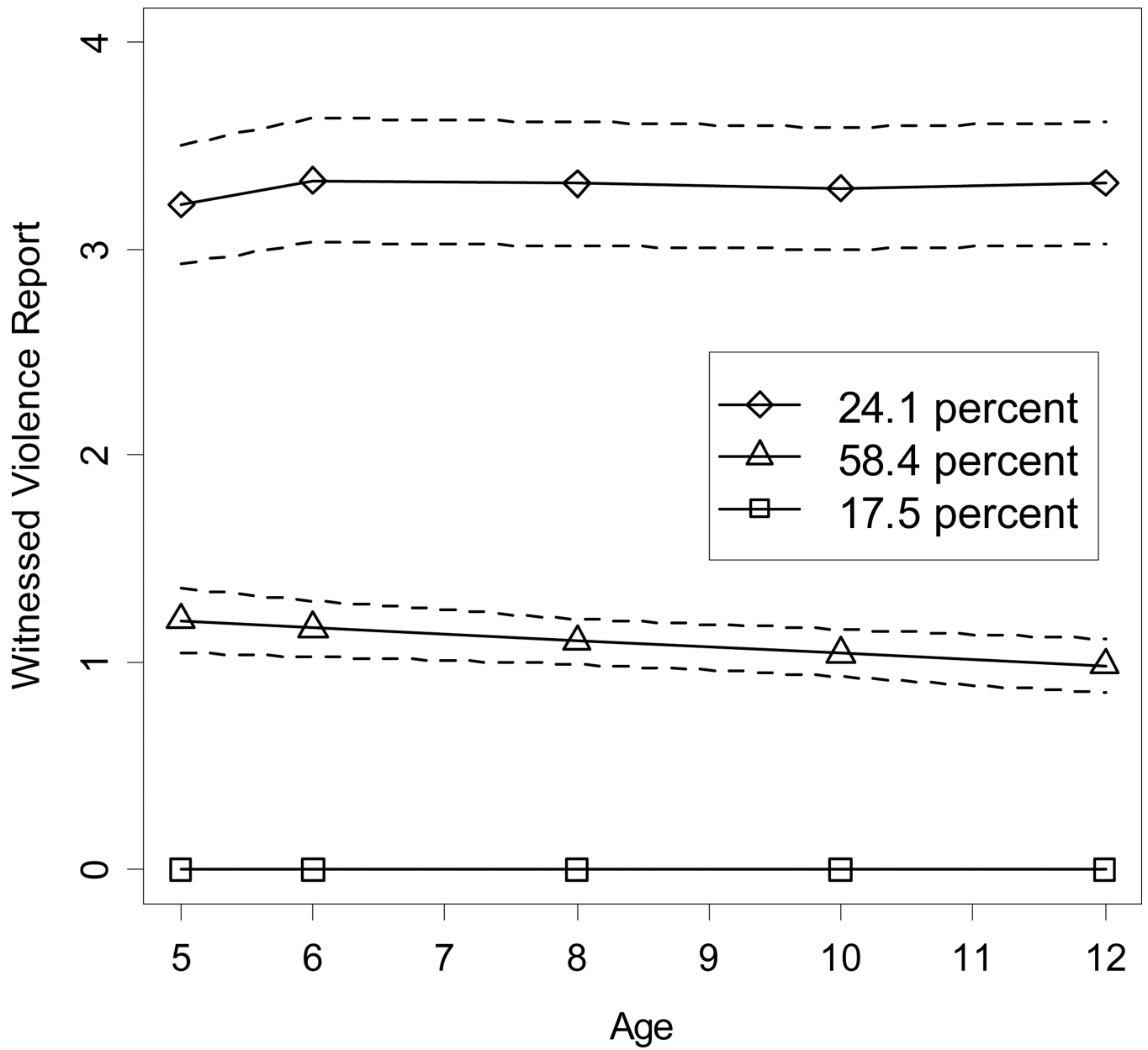
**Figure 2.**  
Trajectories of physical abuse



**Figure 3.**  
Trajectories of emotional abuse



**Figure 4.**  
Trajectories of neglect



**Figure 5.**  
Trajectories of witnessed violence

**Table 1**

Overlap in group membership of maltreatment and witnessed violence groups.

		<b>Sexual Abuse (SA)</b>		
		<b><u>No Allegations</u></b>	<b><u>Curvilinear</u></b>	
Physical Abuse (PA)				
No Allegations	531 (92.2%)	45 (7.8%)		
High Level Remit	193 (72.0%)	75 (28.0%)		
Emotional Abuse (EA)				
No Allegations	522 (91.4%)	49 (8.6%)		
High Level Remit	61 (79.2%)	16 (20.8%)		
Low Level Chronic	141 (71.9%)	55 (28.1%)		
Neglect (N)				
No Allegations	352 (95.7%)	16 (4.3%)		
High Level Remit	199 (83.6%)	39 (16.4%)		
Low Level Chronic	173 (72.7%)	65 (27.3%)		
Witnessed Violence (WV)				
No Allegations	190 (88.8%)	24 (11.2%)		
High Level Remit	117 (80.7%)	28 (19.3%)		
Low Level Chronic	417 (86.0%)	68 (14.0%)		
		<b>Physical Abuse (PA)</b>		
		<b><u>No Allegations</u></b>	<b><u>High Level Remit</u></b>	
Sexual Abuse (SA)				
No Allegations	531 (73.3%)	193 (26.7%)		
Curvilinear	45 (37.5%)	75 (62.5%)		
Emotional Abuse (EA)				
No Allegations	477 (83.5%)	94 (16.5%)		
High Level Remit	27 (35.1%)	50 (64.9%)		
Low Level Chronic	72 (36.7%)	124 (63.3%)		
Neglect (N)				
No Allegations	332 (90.2%)	36 (9.8%)		
High Level Remit	136 (57.1%)	102 (42.9%)		
Low Level Chronic	108 (45.4%)	130 (54.6%)		
Witnessed Violence (WV)				
No Allegations	164 (76.6%)	50 (23.4%)		
High Level Remit	80 (55.2%)	65 (44.8%)		
Low Level Chronic	332 (68.5%)	153 (31.5%)		
		<b>Emotional Abuse (EA)</b>		
		<b><u>No Allegations</u></b>	<b><u>High Level Remit</u></b>	<b><u>Low Level Chronic</u></b>
Sexual Abuse (SA)				
No Allegations	522 (72.1%)	61 (8.4%)	141 (19.5%)	
Curvilinear	49 (40.8%)	16 (13.3%)	55 (45.8%)	

<b>Sexual Abuse (SA)</b>			
	<b><u>No Allegations</u></b>	<b><u>Curvilinear</u></b>	
<b>Physical Abuse (PA)</b>			
No Allegations	477 (82.8%)	27 (4.7%)	72 (12.5%)
High Level Remit	94 (35.1%)	50 (18.7%)	124 (46.3%)
<b>Neglect (N)</b>			
No Allegations	343 (93.2%)	9 (2.4%)	16 (4.3%)
High Level Remit	133 (55.9%)	47 (19.7%)	58 (24.4%)
Low Level Chronic	95 (39.9%)	21 (8.8%)	122 (51.3%)
<b>Witnessed Violence (WV)</b>			
No Allegations	157 (73.4%)	20 (9.3%)	37 (17.3%)
High Level Remit	92 (63.4%)	7 (4.8%)	46 (31.7%)
Low Level Chronic	322 (66.4%)	50 (10.3%)	113 (23.3%)

<b>Neglect (N)</b>			
	<b><u>No Allegations</u></b>	<b><u>High Level Remit</u></b>	<b><u>Low Level Chronic</u></b>
<b>Sexual Abuse (SA)</b>			
No Allegations	352 (48.6%)	199 (27.5%)	173 (23.9%)
Curvilinear	16 (13.3%)	39 (32.5%)	65 (54.2%)
<b>Physical Abuse (PA)</b>			
No Allegations	332 (57.6%)	136 (23.6%)	108 (12.5%)
High Level Remit	36 (13.4%)	102 (38.1%)	130 (46.3%)
<b>Emotional Abuse (EA)</b>			
No Allegations	343 (60.1%)	133 (23.3%)	95 (16.6%)
High Level Remit	9 (11.7%)	47 (61.0%)	21 (27.3%)
Low Level Chronic	16 (8.2%)	58 (29.6%)	122 (62.2%)
<b>Witnessed Violence (WV)</b>			
No Allegations	157 (73.4%)	20 (9.3%)	37 (17.3%)
High Level Remit	92 (63.4%)	7 (4.8%)	46 (31.7%)
Low Level Chronic	322 (66.4%)	50 (10.3%)	113 (23.3%)

<b>Witnessed Violence (WV)</b>			
	<b><u>No Allegations</u></b>	<b><u>High Level Remit</u></b>	<b><u>Low Level Chronic</u></b>
<b>Sexual Abuse (SA)</b>			
No Allegations	190 (26.2%)	117 (16.2%)	417 (57.6%)
Curvilinear	24 (20.0%)	28 (23.3%)	68 (56.7%)
<b>Physical Abuse (PA)</b>			
No Allegations	164 (28.5%)	80 (13.9%)	332 (57.6%)
High Level Remit	50 (18.7%)	65 (24.3%)	153 (57.1%)
<b>Emotional Abuse (EA)</b>			
No Allegations	157 (60.1%)	92 (16.1%)	322 (56.4%)
High Level Remit	20 (11.7%)	7 (9.1%)	50 (64.9%)
Low Level Chronic	37 (8.2%)	46 (23.5%)	113 (57.7%)
<b>Neglect (N)</b>			

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	<b>Sexual Abuse (SA)</b>		
	<b><u>No Allegations</u></b>	<b><u>Curvilinear</u></b>	
No Allegations	102 (27.7%)	55 (14.9%)	211 (57.3%)
High Level Remit	66 (27.7%)	30 (12.6%)	142 (59.7%)
Low Level Chronic	46 (19.3%)	60 (25.2%)	132 (55.5%)

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**Table 2**

The statistical significance (5%) level of sexual abuse, physical abuse, emotional abuse, neglect and witnessed violence in explaining youth engagement in either alcohol use or sexual intercourse or both<sup>ab</sup>.

Abuse/Violence	Model 1	Model 2	Model 3	Model 4	Model 5
	SA Only Either Both	SA & PA Either Both	SA & EA Either Both	SA & Neglect Either Both	SA & WV Either Both
<u>Block 1</u>					
Child Gender <sup>c</sup>	ns	S-			
<u>Block 2</u>					
Sexual Abuse (SA) <sup>d</sup>	S+	S+			
<u>Block 3</u>					
Physical Abuse (PA) <sup>e</sup>		ns	S+		
Emotional Abuse (EA) <sup>f</sup>			ns	ns	
Emotional Abuse (EA) 2 <sup>g</sup>			ns	S+	
Neglect (N) 1 <sup>h</sup>				ns	ns
Neglect (N) 2 <sup>i</sup>				ns	ns
Witnessed Violence (WV) 1 <sup>j</sup>					ns
Witnessed Violence (WV) 2 <sup>k</sup>					ns

<sup>a</sup> 2-way interactions of SA x Gender and SA x respective maltreatment or witnessed violence experience were entered on Block 4 of Models 2 to 5; however, since none of the 2-way interactions were statistically significant they were not included in the Table.

<sup>b</sup> Site was not covaried in analyses as already controlled in trajectory analyses;

<sup>c</sup> boy = 0, girl = 1;

<sup>d</sup> Curvilinear group relative to low group;

<sup>e</sup> High Level Remit relative to no allegations;

<sup>f</sup> Low Level Chronic relative to No Allegations;

<sup>g</sup> High Level Remit relative to No Allegations;

<sup>h</sup> Low Level Chronic relative to No Allegations;

$f_1$  High Level Remit relative to No Allegations;

$f_2$  Low Level Chronic relative to No Allegations;

$f_3$  High Level Chronic relative to No Allegations note: S =  $p < .05$ ; ; (+ or - reflects direction of association); n.s. = not significant