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Maltreatment Clusters Among Youth in Outpatient Substance Abuse Treatment: Co-Occurring Patterns of Psychiatric Symptoms and Sexual Risk Behaviors

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Abstract The purpose of the current study was to describe the use of a brief maltreatment assessment instrument to classify adolescents receiving alcohol or other drug (AOD) treatment services based on the extensiveness and severity of prior maltreatment. This goal is significant because maltreatment reduces the effectiveness of AOD treatment and is associated significantly with co-occurring patterns of psychiatric symptoms and sexual risk behaviors. Structured interviews were administered to 300 adolescent treatment clients (202 males, 98 females; $M = 16.22$ years; $SD = 1.13$ years) to assess childhood maltreatment experiences, past year psychiatric symptoms, and sexual risk behaviors during the past 180 days. Cluster analysis classified adolescents into unique groups via self-reported sexual abuse, physical punishment, and parental neglect/negative home environment. Significant between-cluster differences in psychiatric symptoms and sexual risk behaviors were documented using MANOVA and chi-square analyses. More severe maltreatment profiles were associated with higher scores for psychiatric symptoms and unprotected intercourse. Significant heterogeneity and distinct types within this treatment sample of adolescents supports the adaptation of selected prevention efforts to promote HIV/STI risk reduction.

Keywords Adolescents · Maltreatment · Substance abuse · Cluster analysis · Sexual risk behaviors

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Introduction

Maladaptive alcohol and other drug (AOD) use is a contributing factor to adverse health outcomes among youth, including exposure to HIV and other sexually transmitted infections (STIs; Aicken, Nardone, & Mercer, 2010). Adolescents who meet diagnostic criteria for substance use disorders (SUDS) report higher scores for behavioral risk factors for HIV/STI exposure, compared to delinquent adolescents with a major mental disorder (MMD) and SUDS, or to delinquent adolescents with neither disorder (e.g., Elkington et al., 2008), as well as frequently co-occurring psychiatric symptoms or diagnoses (Chen, Killeya-Jones, & Vega, 2005). Childhood maltreatment is a significant general risk factor for substance use problems, psychiatric symptoms, and sexual risk behaviors among youth in both community and treatment samples (Gilbert et al., 2009).

The mechanisms by which maltreatment may promote sexual risk behavior have been described in several conceptual models. Miller (1999) proposed that, among women with histories of childhood sexual abuse, factors such as substance use as a coping strategy, poor sexual adjustment, psychopathology, and features of their social environment all interact to mediate the influence of sexual abuse on sexual risk behaviors. In Briere's (2002) self-trauma model, early abuse experiences promote deficits in facets of socioemotional competence, including assumptions regarding self and relationships with others, and inadequately developed affect regulation capacities. In this model, interactions among ongoing distress, re-experienced abuse, and poor affect regulation increase the use of avoidance and dissociation to manage feelings of distress, a coping strategy that may increase expression of sexual risk behaviors. Empirical evaluations of models such as the Multifaceted Model of HIV Risk (MMOHR; Whitmire, Harlow, Quina, & Morokoff, 1999) have supported Briere's model by documenting significant relations between childhood abuse experiences, poorer

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psychosocial functioning, and lower levels of self-protective sexual behaviors.

Heterogeneity Among Adolescents in AOD Treatment

Significant heterogeneity has been noted among adolescents with AOD abuse problems receiving AOD treatment services (Esposito-Smythers & Goldston, 2008), and this heterogeneity is likely to extend to their histories of childhood maltreatment. Maltreatment varies by type (e.g., physical or sexual abuse, neglect), severity (scores for each type), as well as developmental factors, such as timing of onset and duration, contributing probabilistically to the quality of specific outcomes (Stewart, Livingston, & Dennison, 2007). Investigation of vulnerable populations of adolescents, or of adults providing retrospective data, have documented multiple, interrelated forms of maltreatment, including physical, sexual, and emotional abuse, physical and emotional neglect, as well as witnessed family violence or other aspects of household dangerousness (e.g., Hahm, Lee, Ozonoff, & Wert, 2010). While experiences of maltreatment are interrelated (e.g., one type of maltreatment experience increases the likelihood of another type), only a minority of participants report multiple forms of childhood maltreatment experiences, creating important subgroups within broader samples of vulnerable youth (e.g., Edwards, Holden, Felitti, & Anda, 2003).

Mixed evidence exists about the specificity of relations between childhood maltreatment experiences and adverse health outcomes, such as sexual risk behavior and psychopathology (Smith, Leve, & Chamberlain, 2006). While some studies suggest that sexual abuse is predictive of sexual risk behavior after controlling for other types of childhood maltreatment experiences, other studies suggest that the cumulative impact of maltreatment on a broad range of health outcomes may be just as important to investigate as specific maltreatment-health risk behavior relations (Stoltz et al., 20007; Tubman, Montgomery, Gil, & Wagner, 2004). Relations between childhood maltreatment and mental health and substance abuse outcomes in samples of adolescents and adults receiving social and health care services highlight the detrimental impact of cumulative abuse experiences on mental health and health risk behavior outcomes (Edwards et al., 2003; Hazen, Connelly, Roesch, Hough, & Landsverk, 2008). The extension of this research to investigate the cumulative impact of maltreatment among adolescents receiving AOD treatment services would enable AOD treatment providers to tailor treatment services to include focused content to address clients' childhood maltreatment experiences and to reduce their risk for post-treatment relapse (Boles, Joshi, Grella, & Wellisch, 2005) and exposure to HIV/STIs (Senn, Carey, Vanable, Coury-Doniger, & Urban, 2006).

The Current Study

This study focused explicitly on heterogeneity in childhood maltreatment among adolescents undergoing outpatient AOD treatment. First, a person-centered analytic approach (i.e., Ward's Method cluster analysis) was used to classify a sample of clients into distinct and non-overlapping groups on the basis of self-reported experiences of childhood maltreatment (von Eye & Bogat, 2006). Second, between-group differences in psychiatric symptoms and sexual risk behaviors were documented to determine if maladaptive patterns of co-occurring problems were specific to particular forms, combinations or levels of maltreatment. Our hypothesis was that adolescents reporting cumulatively more severe patterns (i.e., higher scores on multiple dimensions) of maltreatment would also report more severe patterns of psychiatric symptoms and sexual risk behaviors. This study was intended to demonstrate the utility of screening procedures in outpatient treatment settings to identify adolescents at elevated behavioral risk for HIV/STI exposure.

Method

Participants

The sample consisted of 300 adolescents, including 202 males (67.3%) and 98 females (32.7%), receiving AOD use treatment services at two outpatient facilities in South Florida. Participants ranged in age from 12 to 18 years ($M = 16.22$ years; $SD = 1.13$). The sample was ethnically diverse and included 79 (26.3%) non-Hispanic White, 108 (36.0%) Hispanic White, 27 (9.0%) Hispanic Black, 64 (21.3%) African American, and 22 (7.3%) adolescents from other ethnic groups. Most ($n = 245$, 81.7%) adolescents were born in the United States, while 138 (46.0%) of fathers and 156 (52.0%) of mothers were born in the United States. The majority of the sample ($n = 222$, 74.0%) listed a mother, father, or both as primary caregiver(s). Over half of the participants ($n = 157$, 52.3%) reported repeating one or more school grades.

Measures

The Child Abuse and Trauma Scale (CATS; Sanders & Becker-Lausen, 1995)

The 38-item CATS was used to measure experiences of maltreatment during childhood or adolescence. The CATS contains three subscales that assess dimensions of childhood maltreatment history: Neglect/Negative Home Environment, Punishment, and Sexual Abuse. Each item was rated from *never* (1) to *always* (5) and five items were reverse coded before scale

scores were aggregated. Higher scores for each subscale indicate more severe experiences of childhood maltreatment. The possible ranges for the CATS subscales were as follows: Neglect/Negative Home Environment (14–70), Punishment (6–30), and Sexual Abuse (6–30). In the current sample, the CAT subscales were found to have acceptable internal consistency for Neglect/Negative Home Environment (14 items, $\alpha = .87$), Sexual Abuse (6 items, $\alpha = .74$), and Punishment (6 items, $\alpha = .65$). In addition, the test–retest reliability of the CATS has been shown to be excellent for the Neglect/Negative Home Environment ($r = .91$), Sexual Abuse ($r = .85$), and Punishment ($r = .71$) subscales. The CATS demonstrates significant convergent validity with similar measures (Higgins & McCabe, 2001).

DSM-IV Psychiatric Symptoms

Symptoms diagnostic of lifetime and past year DSM-IV psychiatric diagnoses were assessed via the Brief Michigan Version of the Composite International Diagnostic Interview (CIDI-UM; Kessler et al., 1994). The CIDI is a comprehensive, fully structured diagnostic interview developed by the World Health Organization (1990) and based, in part, on the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan, & Ratcliff, 1981). The CIDI was administered by trained lay interviewers as a means to assess disorders defined by the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994). The computerized delivery of items on the CIDI-UM included appropriate skip patterns and probe questions, and did not allow out-of-range responses, simplifying the administration of the instrument. This instrument was developed to standardize the assessment of disorders in community settings (Kessler & Üstün, 2004). The CIDI-UM has excellent interrater reliability, good test–retest reliability, as well as sufficient validity based on concordance with clinical judgments and structured clinical interviews (Kessler et al., 1994; Wittchen, 1994). Variables in multivariate analyses of variance (MANOVA) following the clustering of maltreatment scores were six aggregated symptom score categories derived from the CIDI-UM. These included: (1) Conduct Disorder(CD)/Oppositional Defiant Disorder (ODD); (2) Affective Disorders (Major Depressive Disorder, Dysthymia); (3) Anxiety Disorders [Generalized Anxiety Disorder (GAD), Specific Phobia, Social Phobia, Panic Disorder]; (4) Alcohol Abuse and Dependence Disorders; (5) Drug Abuse and Dependence Disorders; and (6) Attention Deficit Hyperactivity Disorder (ADHD), including both the Inattentive and Hyperactive subtypes.

In addition, current suicidal risk was assessed using five self-report items ($\alpha = .78$, in the current sample) from the General Health Questionnaire (GHQ; Goldberg & Hillier, 1979). Items were rated from (1) *not a lot* to (4) *much more than usual*. Participants rated how often they: "felt that life is not worth living," "thought about doing away with yourself," "could not do anything because your nerves were too bad," "wishing you were dead and away from it all," and "idea of taking your life kept coming into your mind." These items were included to validate the cluster solution by examining between-cluster differences in indicators of suicide risk.

Timeline Follow Back-Sexual Risk Behavior (TLFB-SRB)

The standard TLFB instrument (Sobell & Sobell, 1996) was modified to collect data regarding adolescents' self-reported sexual risk behavior, including unprotected intercourse, number of partners, and co-occurring substance use and sexual behavior (Carey, Carey, Maisto, Gordon, & Weinhardt, 2001). An adapted calendar format was used to assist in the recall of days when target sexual risk behaviors occurred. Participants completed the TLFB-SRB for the 180 days immediately prior to the baseline assessment. Similarly adapted TLFB calendar methodology has been used in published research to assess sexual risk behaviors in persons with AOD use problems such as adult men who have sex with men (MSM; Midanik et al., 1998) and psychiatric inpatients (Carey et al., 2001) with adequate reliability and validity.

Five additional items were used as indicators of sexual risk for HIV/STI exposure. Participants were asked to report their total number of sex partners during the past six months, i.e., "*how many different people, including men and women, have you had sex (vaginal, anal or oral) with even if only one time?*" Participants were asked if they or their partners used a condom the last time they had sex, to which they responded *yes* or *no*. In addition, participants were asked, "*when you have sex, how often do you use a condom?*" This item had the response format: *every time* (5), *almost every time* (4), *sometimes* (3), *almost never* (2), or *never* (1). Finally, participants also were asked to report how often during the past six months they or a partner (1) drank alcohol before or during sex or (2) used any drugs to get high or intoxicated before or during sex. These last two items used the response formats: *always* (5), *usually* (4), *sometimes* (3), *rarely* (2), or *never* (1). These five items were included because they are recognized risk factors for HIV/STI exposure (e.g., Kalichman, Tannenbaum, & Nachimson, 1998).

Procedure

Groups of adolescent clients were approached within one week of enrollment in outpatient AOD treatment services and invited to participate in the brief motivational HIV/STI risk reduction intervention from which data for the current study were drawn. Clients were read the eligibility criteria, and if interested, were invited to contact a project staff member to have their eligibility confirmed and to begin the informed consent process. Each potential participant was screened for sexual activity participation during the last six months as an inclusion criterion. Adolescents who, by case manager report, were

actively suicidal or who exhibited significant cognitive deficits or developmental delays were not eligible to participate, due to (1) ethical concerns about client safety and (2) the cognitive abilities required for the psychotherapeutic intervention delivered in the treatment arm of the larger study. Parental consent was also required for study participation. Adolescents who met inclusion criteria were assessed for DSM-IV psychiatric symptoms and they were administered a battery of questionnaires before being enrolled in the HIV/STI risk reduction intervention.

At entry into the broader NIAAA-funded intervention program, participants completed a 60- to 90-min assessment focused on multiple domains including: substance use, sexual risk behaviors, demographics, as well as putative mediators and moderators of intervention impact. Trained graduate students collected data using a structured interview protocol on laptop computers at the facilities in which clients were receiving AOD treatment services. Active consent was obtained from both adolescents and a primary caregiver via procedures approved by the Institutional Review Board at the sponsoring university. Participants were compensated $25 for completing the baseline assessment from which data were drawn and analyzed for the current study.

Results

Table 1 summarizes means, *SD*s, ranges, and correlations among continuous variables used in analyses. Significant bivariate correlations are noted.

Between-Cluster Differences in Maltreatment Scores

Four cluster solutions were compared (containing two to five clusters) on several criteria: Changes in the fusion coefficients associated with the agglomeration schedule, cluster sizes, between-cluster differences on component variables, and the magnitude of associated *F* tests, as well as conceptual considerations. The three-part solution was selected as optimal because (1) it emphasized the importance of CATS subscales for both sexual abuse and neglect/negative home environment; (2) it maximized the *F* values for between-cluster comparisons for both of these CATS subscales; (3) it identified clusters with high, medium, and low average scores for multiple forms of maltreatment; and (4) it identified a high risk group with high scores for the three forms of maltreatment assessed while maximizing the size of the other two clusters.

In a MANOVA of the three CATS subscale scores, the Pillai's Trace multivariate test statistic indicated an overall pattern of significant differences across the three maltreatment clusters, $V = 0.96$, $F(6, 570) = 88.21$, $p < .001$. The overall effect size was $n^2 = .48$. Univariate *F* statistics documented significant differences by cluster membership for each CAT subscale: Punishment, $F(2, 286) = 26.19$, $p < .001$; Neglect/Negative Home Environment, $F(2, 286) = 145.33$, $p < .001$; and Sexual Abuse, $F(2, 286) = 210.83$, $p < .001$. Significant between-cluster differences in mean CAT subscale scores are indicated in Table 2 via different subscripts, based on post hoc comparisons using the Tukey HSD test. Cluster analysis was conducted using standardized scores for CATS scores, but means summarized in Table 2 were based on non-standardized scores to facilitate the presentation of results.

Table 1 Correlations, means, *SD*s, and ranges for continuous variables in analyses

	CATS Sexual Abuse score	CATS Neglect score	CATS Punishment score	*M*	*SD*	Absolute range
CD/ODD symptoms	0.05	0.14*	0.02	10.69	3.76	0–23
Anxiety symptoms	0.12*	0.23**	0.05	8.30	5.25	0–30
Affective symptoms	0.21**	0.44**	0.21**	3.30	4.09	0–18
Alcohol symptoms	0.25**	0.29**	0.21**	1.62	2.18	0–10
Drug symptoms	−0.06	0.16**	0.05	4.60	3.47	0–11
ADHD symptoms	0.03	0.22**	0.09	9.32	5.27	0–18
Total distress score	0.24**	0.33**	0.16**	6.06	2.03	5–18
Proportion unprotected intercourse	0.15**	0.21**	−0.01	0.35	0.39	0–1
Condom frequency scale	0.21**	0.24**	0.14*	3.80	1.30	1–4
Sex partners (6 months)	0.04	0.00	0.07	3.70	5.90	1–16
Alcohol use during sex	0.12*	0.10	0.08	2.07	1.08	1–4
Drug use during sex	0.04	0.13*	0.07	2.58	1.38	1–4
M	1.24	2.22	2.59	–	–	–
SD	0.51	0.80	0.76	–	–	–
Range	1–4.5	1–5	1–5	–	–	–

* $p < .05$; ** $p < .01$

Table 2 Mean scores of non-standardized CATS subscales for the three-part cluster solution

CAT scale	Low Abuse ($n = 175$)		Intermediate Abuse ($n = 94$)		High Abuse ($n = 23$)		Test statistic $F(2, 289)$
	M	*SD*	*M*	*SD*	*M*	*SD*	
Sexual abuse[a]	1.04 a	0.13	1.24 b	0.30	2.69 c	0.65	210.83*
Punishment[b]	2.30 a	0.53	2.90 b	0.77	3.46 c	1.00	26.19*
Neglect[b]	1.72 a	0.40	2.81 b	0.54	3.55 c	0.85	145.33*

Note: For MANOVA of non-standardized CATS scores by cluster membership, Pillai's trace = 1.12, $F(6, 576) = 122.99$, $p < .001$. Cluster means for CATS scores with different letters were significantly different by Tukey HSD tests with significance levels of .001

* $p < .001$

[a] Absolute range, 1–4.5

[b] Absolute range, 1–5

Cluster 1 (*Low Abuse*; $n = 175$) reported the lowest average scores for all CATS subscales. Cluster 2 (*Intermediate Abuse*; $n = 94$) reported intermediate average scores for all CATS subscales. Cluster 3 (*High Abuse*; $n = 23$) was characterized by high scores for all CATS subscales. Maltreatment cluster membership was associated with gender, $\chi^2(2, N = 292) = 51.19$, $p < .001$; female adolescents were over-represented in the *Intermediate Abuse* Cluster and the *High Abuse* Cluster, but underrepresented in the *Low Abuse* Cluster. Cluster membership was also associated with current primary caregiver(s), $\chi^2(8, N = 292) = 53.20$, $p < .001$. Members of the *High Abuse* Cluster were less likely to be cared for by their mothers, fathers or both parents and more likely to be cared for by non-relatives than members of the *Low Abuse* or *Intermediate Abuse* Clusters. In addition, cluster membership was associated significantly with age, $F(2, 289) = 3.28$, $p < .05$, but not with other demographic characteristics, such as ethnicity, child or parent nativity, or repeating a grade. Members of the *High Abuse* Cluster ($M = 15.73$ years, $SD = 1.06$) were significantly younger ($p < .05$) than members of the *Low Abuse* Cluster ($M = 16.32$ years, $SD = 1.19$).

The MANOVA of CATS subscale scores also revealed significant Pillai's Trace multivariate test statistics for gender, $V = 0.04$, $F(3, 284) = 4.27$, $p < .01$, $n^2 = .043$, as well as a Cluster Membership × Gender interaction, $V = 0.07$, $F(6, 570) = 3.24$, $p < .01$, $n^2 = .033$. Univariate follow up tests documented significant gender differences for CATS Sexual Abuse scores, $F(1, 286) = 7.90$, $p < .01$, $n^2 = .027$, with girls ($M = 1.53$) reporting significantly higher scores for sexual abuse than boys ($M = 1.10$). Gender differences in scores for Punishment and Neglect/Negative Home Environment were not statistically significant. Univariate follow-up tests documented significant Cluster Membership × Gender interactions for the CATS Punishment, $F(2, 286) = 7.00$, $p < .001$, $n^2 = .05$, and Sexual Abuse, $F(2, 286) = 3.12$, $p < .05$, $n^2 = .02$ subscales. In both cases, discrepancies between the mean CATS subscale scores reported by boys and girls were larger in clusters defined by more severe experiences of childhood maltreatment. In the *High Abuse* Cluster, girls reported higher mean scores than boys for both Punishment (3.58 vs. 2.87) and Sexual Abuse (2.73 vs. 2.50).

Between-Cluster Differences in Psychiatric Symptoms

Table 3 presents between-cluster differences in psychiatric symptoms as measured by the CIDI-UM, summarized by broad diagnostic categories. The Pillai's trace multivariate test statistic indicated an overall pattern of significant differences across the three maltreatment clusters, $V = 0.28$, $F(12, 570) = 7.66$, $p < .001$. The overall effect size was $n^2 = .14$. Univariate F statistics documented significant differences in symptom counts by cluster membership for: Anxiety symptoms, Affective symptoms, Alcohol Abuse/Dependence symptoms and ADHD symptoms. Between-cluster differences in mean scores of CIDI-UM symptom counts were examined further in post hoc comparisons using the Tukey HSD test. The results suggested that significant between-cluster differences in past year CIDI-UM symptoms were associated with the multivariate severity of patterns of childhood maltreatment.

Members of the *Low Abuse* Cluster reported significantly lower scores for affective disorder symptoms than members of the *Intermediate Abuse* or *High Abuse Clusters*. With regard to anxiety disorder symptoms and ADHD symptoms, the *Low Abuse* Cluster reported significantly lower aggregate scores than members of the *Intermediate Abuse* Cluster. Finally, there appeared to be a positive linear relation between severity of childhood maltreatment and self-reported scores for alcohol abuse and dependence symptoms. At the item level, significant between-cluster differences were identified for three of four alcohol abuse criteria, as well as six of seven alcohol dependence criteria. For each alcohol abuse/dependence criterion, members of the *High Abuse* Cluster reported the highest past year prevalence of the criterion, regardless of whether between-cluster differences attained statistical significance.

Significant between-cluster differences in prevalence rates for the assignment of CIDI-UM diagnoses paralleled findings previously described at the level of CIDI-UM symptoms.

Table 3 Mean scores of CIDI symptom counts for the three-part cluster solution

CIDI symptoms	Low Abuse ($n = 175$)		Intermediate Abuse ($n = 94$)		High Abuse ($n = 23$)		Test statistic	
	M	*SD*	*M*	*SD*	*M*	*SD*	*df*	*F*
Anxiety[a]	7.32 a	3.91	9.97 b	6.56	9.65 ab	6.36	2, 289	9.01**
Affective[b]	1.83 a	2.92	5.49 b	4.51	4.87 b	4.63	2, 289	33.27**
Alcohol symptoms[c]	1.19 a	1.87	1.95 b	2.85	3.48 c	2.92	2, 289	13.96**
Drug symptoms[d]	4.37	3.37	5.13	3.57	4.09	3.55	2, 289	1.75
ADHD[e]	8.68 a	5.23	10.42 b	5.26	10.17 ab	4.78	2, 289	3.74*
CD/ODD[f]	10.49	3.62	11.18	3.64	11.52	3.76	2, 289	1.62

Note: For MANOVA of CIDI symptom count variables by cluster membership, Pillai's trace = .28, $F(12, 570) = 7.66$, $p < .001$. Cluster means for CIDI symptom count variables with different letters were significantly different, by Tukey HSD tests with significance levels of .05

* $p < .05$; ** $p < .001$

[a] Absolute range, 0–30

[b] Absolute range, 0–18

[c] Absolute range, 0–10

[d] Absolute range, 0–11

[e] Absolute range, 0–18

[f] Absolute range, 0–23

Significant between-cluster differences in prevalence rates for the assignment of specific CIDI-UM diagnoses were identified for: Major Depression, $\chi^2(2, N = 292) = 6.45$, $p < .05$; Dysthymia, $\chi^2(2, N = 292) = 8.44$, $p < .05$; GAD, $\chi^2(2, N = 292) = 24.40$, $p < .001$; Panic Disorder, $\chi^2(4, N = 292) = 9.88$, $p < .05$; Alcohol Abuse, $\chi^2(2, N = 257) = 21.98$, $p < .001$; and Alcohol Dependence, $\chi^2(2, N = 292) = 14.85$, $p < .001$. With the exception of Panic Disorder, significant between-cluster differences in the assignment of CIDI-UM generated psychiatric diagnoses were attributable to the *High Abuse* Cluster, which generally had the highest rates of assigned diagnoses. The *Intermediate Abuse* Cluster had the highest rate of assignment of Panic Disorder. Finally, an ANOVA of total scores for the five GHQ items assessing suicide risk by cluster membership was significant, $F(2, 289) = 9.88$, $p < .001$. *Post-hoc* comparisons using the Tukey HSD test revealed that the highest levels of distress were reported by the *High Abuse* Cluster ($M = 7.43$, $SD = 2.74$). The mean total distress score reported by the *High Abuse* and *Intermediate Abuse* Clusters ($M = 6.40$, $SD = 2.30$) were significantly higher than those reported by the Low Abuse Cluster ($M = 5.70$, $SD = 1.66$).

Between-Cluster Differences in Sexual Risk Behaviors

Table 4 summarizes significant between-cluster differences in several indicators of sexual risk behaviors reported by this sample of adolescents undergoing AOD treatment. In general, the lowest average scores for self-reported sexual risk behavior were documented in the *Low Abuse* Cluster, which also reported the lowest CATS scores and the lowest scores for several CIDI-UM symptom categories. In contrast, the highest average scores for self-reported sexual risk behaviors were documented in the *High Abuse* Cluster, which also reported the highest CATS scores. Members of the *High Abuse* Cluster reported the lowest likelihood of condom use at last intercourse, the lowest mean score for condom use frequency, and the highest proportion of unprotected sexual intercourse during the past six months. In contrast, members of the *Low Abuse* Cluster reported the lowest mean proportions of unprotected intercourse, as well as the most consistent patterns of condom use. The *Intermediate Abuse* Cluster reported mean scores for the condom use and unprotected intercourse variables that were between those of the other two clusters. There were no statistically significant between-group differences in mean scores for (1) number of sex partners during the past six months, (2) alcohol use before or during sex or (3) drug use before or during sex. These findings described substantial heterogeneity in specific sexual risk behaviors (i.e., condom use, proportion of unprotected intercourse) within this clinical sample of adolescents, significantly associated with patterns of self-reported maltreatment experiences.

Discussion

Adolescents receiving AOD treatment services represent a heterogeneous population, varying significantly with regard to childhood maltreatment experiences, AOD use patterns and related negative consequences, psychiatric symptoms, and sexual risk behavior (Emmelkamp & Vedel, 2006). This heterogeneity was captured via the use of a person-centered analytic strategy with screening data to classify individuals in the sample into a typology based on multivariate patterns of self-

Table 4 Sexual risk behavior indices by cluster for the three-part cluster solution

	Low Abuse ($n = 175$)	Intermediate Abuse ($n = 94$)	High Abuse ($n = 23$)	Test statistic
Used a condom at last intercourse[a]	125 (71.4%)	48 (51.1%)	11 (47.8%)	$\chi^2(2, N = 292) = 13.35$**
Mean sex partners[b]	3.31	3.31	3.00	$F(2, 289) < 1$
SD	3.24	3.79	3.70	
% Unprotected intercourse[c]	0.29 a	0.39 ab	0.52 b	$F(2, 289) = 4.14$*
SD	0.36	0.40	0.44	
Condom use frequency[d]	4.04 a	3.58 b	3.27 b	$F(2, 289) = 6.44$*
SD	1.15	1.30	1.55	
Alcohol use during sex[e]	2.04	2.01	2.36	$F(2, 289) < 1$
SD	1.06	1.06	1.18	
Drug use during sex[e]	2.57	2.55	2.50	$F(2, 289) < 1$
SD	1.37	1.49	1.40	

Note: $N = 292$. Cluster means for sexual risk behavior variables with different letters were significantly different, by Tukey tests with significance levels of .05

* $p < .01$; ** $p < .001$

[a] Coded yes/no for most recent sexual contact

[b] Variable ranged from 1 to 16

[c] Variable ranged from 0 to 1

[d] Variable ranged from *never* (1) to *every time* (5)

[e] Variables ranged from *never* (1) to *always* (5)

reported maltreatment scores (Mandara, 2003). Documentation of between-cluster differences in psychiatric symptoms, including alcohol abuse and dependence symptoms, may highlight a system of maladaptive thoughts, feelings, and behaviors that maintains risk for HIV/STI exposure (Bergman & Trost, 2006). This process identified a small, distinct, predominantly female subgroup of adolescent clients who reported high scores for multiple dimensions of child maltreatment, including sexual abuse, physical punishment, and neglect/negative home environment, who also reported elevated scores for internalizing symptoms, alcohol use problems, and unprotected intercourse. These analyses facilitated description of how cumulative maltreatment might act as a general risk factor for multiple co-occurring behavioral risk factors for HIV/STI exposure (Nurius & Macy, 2008).

These findings were consistent with and supplement existing literature on the short- and long-term influences of multiple co-occurring forms of maltreatment upon patterns of adjustment among multi-problem youth (Stewart et al., 2007). Specifically, the results of the current study supported the hypothesis that cumulative maltreatment experiences were associated with more maladaptive patterns of psychiatric symptoms and health risk behaviors (Edwards et al., 2003; Tubman et al., 2004). However, in contrast to the study conducted by Hazen et al. (2008), which also involved the formation of a typology following the classification of their sample, the typology in the current study reflected increasingly severe patterns of maltreatment across the component variables (i.e., increasing scores for all maltreatment dimensions), rather than the relative absence of a particular indicator of maltreatment for specific clusters. The findings also highlighted childhood maltreatment as a general risk factor for a broad range of adverse health outcomes in adolescence, such as HIV/STI transmission, via both behavioral and emotional pathways (Gilbert et al., 2009; Lesserman, 2005). In particular, the current report emphasized the significance of a potential pathway to HIV/STI exposure among girls that was characterized by ongoing distress, internalizing problems, alcohol use disorders, and unprotected intercourse (Auslander et al., 2002; Nelson et al., 2002). Given the current lack of knowledge about the deleterious impacts on young women's health due to relations between trauma and substance use, these putative pathways merit further systematic investigation.

The identification of subgroups of adolescents at particularly high risk for HIV/STI exposure has significant implications for the delivery of both prevention and treatment services in a range of health care settings (Nurius & Macy, 2008; Wurtele, 1999). For example, the current study suggested that adolescents who endorsed one or more indicators of sexual abuse and two or more indicators of parental neglect also reported significantly higher scores for mental health problems and behavioral risk for HIV/STI exposure. This finding highlights the importance of routine screening for childhood maltreatment and other significant risk factors for HIV/STI exposure in substance abuse treatment settings (Dennis & Stevens, 2003). Brief screening for sexual abuse and other forms of physical or psychological maltreatment has

the potential to detect large proportions of multi-problem youth who have experienced these adversities as they access treatment services. Future research should focus on determining specific thresholds for maltreatment experiences that confer increased risk for maladaptive health outcomes. Following identification of vulnerable adolescents, they may be offered specific selected HIV/STI prevention services, tailored to address needs associated with histories of childhood maltreatment. These prevention services may be integrated with AOD treatment or added to ongoing treatment to address separately these co-occurring health risk behaviors (e.g., CDC, 2002). In addition, screening and detection efforts to identify prior maltreatment may be implemented in efforts to tailor the content of AOD treatment services, address adolescent clients' trauma-related needs and to improve AOD treatment outcomes (Grella & Joshi, 2003; Stevens, Murphy, & McKnight, 2003).

The current study included several limitations in design and methods. First, analyses in this article included self-report data from a single source with all related limitations pertinent to internal validity (e.g., inaccurate recall, reporting biases) although the instruments used to collect some of these data, such as the TLFB, the CIDI-UM, and the CATS, are empirically supported with regard to their reliability and validity. While the CATS assessed three dimensions of childhood maltreatment experiences, the data yielded should be supplemented via instruments that assess other adversities in the home environment, such as parental violence or parental substance abuse. Future studies of the short- and long-term impacts of childhood maltreatment experiences may be improved by collecting data from multiple sources, including siblings, parents, and peers. Second, while analyses conducted in the current study constructed descriptive profiles of subgroups defined by past maltreatment experiences, the data were collected retrospectively at baseline. Therefore, caution must be exercised when making causal statements. Last, the current sample was comprised of youth receiving outpatient treatment for AOD use problems who commonly present with co-occurring problem behaviors and psychiatric diagnoses. While the findings of this study may generalize to other samples of adolescents undergoing outpatient AOD treatment, they may not generalize to the experiences of adolescents undergoing inpatient treatment or to general population samples of adolescents. Nevertheless, the findings of the current study highlighted the importance of innovative analytic strategies for (1) identifying homogenous subgroups of adolescents at significantly higher behavioral risk for HIV/STI exposure and (2) providing critical information for the construction of tailored prevention and intervention programs to address their specific needs.

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