Published in final edited form as:

Child Maltreat. 2014 ; 19(0): 261–269. doi:10.1177/1077559514547264.

The Relationship Between Child Maltreatment and Substance Abuse Treatment Outcomes Among Emerging Adults and Adolescents

Bryan R. Garner¹, Brooke D. Hunter¹, Douglas C. Smith², Jane Ellen Smith³, and Mark D. Godley¹

¹Chestnut Health Systems, Bloomington–Normal, IL, USA

²University of Illinois at Urbana–Champaign, IL, USA

³University of New Mexico, Albuquerque, NM, USA

Abstract

Emerging adulthood is the period of greatest risk for problematic substance use. The primary aim of the current study was to examine the relationship between a broad measure of child maltreatment and several key outcomes for a large clinical sample of emerging adults ($n = 858$) and adolescents ($n = 2,697$). The secondary aim was to examine the extent to which the relationship between child maltreatment and treatment outcomes differed between emerging adults and adolescents. Multilevel latent growth curve analyses revealed emerging adults and adolescents who experienced child maltreatment reported significantly greater reductions over time on several treatment outcomes (e.g., substance use, substance-related problems, and emotional problems). Overall, analyses did not support differential relationships between child maltreatment and changes over time in these substance use disorder treatment outcomes for emerging adults and adolescents. The one exception was that although emerging adults with child maltreatment did reduce their HIV risk over time, their improvements were not as great as were the improvements in HIV risk reported by adolescents who had experienced child maltreatment.

Keywords

adolescents; child maltreatment; child trauma

According to the National Incidence Study of Child Abuse and Neglect (NIS; Sedlak et al., 2010), rates of child maltreatment (i.e., emotional, physical, or sexual abuse; emotional, physical, or educational neglect) have declined over the last two decades. This same report also indicates that depending on the definition used (i.e., Harm Standard vs. Endangerment Standard; see Sedlak et al., 2010), between 1.25 million and 3 million children in the United

Reprints and permission: sagepub.com/journalsPermissions.nav

Corresponding Author: Bryan R. Garner, Chestnut Health Systems, 448 Wylie Drive, Normal, IL 61761, USA. brgarner@chestnut.org.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

States experience maltreatment each year. Results from the National Child Abuse and Neglect Data System (NCANDS; U.S. Department of Health and Human Services, 2013) identified 686,000 unique victims of child maltreatment. Results from other studies, which include perpetrators and/or victims of maltreatment in their samples (e.g., Briere & Elliott, 2003; Diaz, Simantov, & Rickert, 2002; Finkelhor, Ormrod, Turner, & Hamby, 2005; Huang et al., 2011; Hussey, Chang, & Kotch, 2006), suggest the NIS and NCANDS reports may represent underestimates. Although the incidence estimates vary by reporting standards, these reports nonetheless suggest child maltreatment is a significant problem within the United States.

The importance of studying child maltreatment is further demonstrated by the research that links child maltreatment with an increased risk for subsequent problems across numerous domains and across multiple life stages. For example, child maltreatment has been linked with problems during adolescence (12–17 years of age; Carson, Sullivan, Cochran, & Lersch, 2009; Funk, McDermeit, Godley, & Adams, 2003; Grella & Joshi, 2003; Shane, Diamond, Mensinger, Shera, & Wintersteen, 2006; Shin, Hong, & Wills, 2012; Smith, Ireland, & Thornberry, 2005; Titus, Dennis, White, Scott, & Funk, 2003), young adulthood (30–40 years of age; Sacks, McKendrick, & Banks, 2008; Shin, Miller, & Teicher, 2013; Widom, Weiler, & Cottler, 1999; Wilson & Widom, 2008, 2011), and middle adulthood (40–50 years of age; Currie & Widom, 2010; Nikulina & Widom, 2013; Widom, Marmorstein, & White, 2006; Widom, White, Czaja, & Marmorstein, 2007; Wilson & Widom, 2008, 2011). Relatively limited research, however, has examined the link between child maltreatment and problems during *emerging adulthood* (18–25 years of age; see Arnett, 2000, 2005 for more detailed descriptions of emerging adulthood).

Based upon our review of the extant literature, we identified four studies that examined the relationship between child maltreatment and various outcomes during emerging adulthood (i.e., Hahm, Lee, Ozonoff, & Van Wert, 2010; Huang et al., 2011; Lo & Cheng, 2007; Smith et al., 2005). Consistent with the findings from the broader child treatment literature, each of these studies found that child maltreatment was associated with significantly increased substance use (Huang et al., 2011; Lo & Cheng, 2007; Smith et al., 2005) and involvement in criminal activity (Hahm et al., 2010; Smith et al., 2005). It is noteworthy, however, that the majority of research (including studies with emerging adults) examining the link between child maltreatment and other important outcomes has relied on national surveys of the general population (e.g., National Longitudinal Study of Adolescent Health, Rochester Youth Development Study) rather than on clinical samples (e.g., emerging adults with substance use disorders [SUDs]). Given the high prevalence of substance use in emerging adults and the fact that substance-related problems peak during this life stage (Substance Abuse and Mental Health Services Administration, 2011), there is a need to examine the extent to which treatment outcomes for emerging adults receiving SUD treatment vary as a function of child maltreatment.

Grella and Joshi (2003) did not find that child maltreatment was generally associated with posttreatment abstinence among a sample of adolescents receiving SUD treatment. Other researchers have found that adolescents with histories of child maltreatment had significantly greater substance use at intake as well as significantly greater reductions in

substance use over time (e.g., Funk et al., 2003; Shane et al., 2006). Given these findings, as well as prior research that suggests there may be important differences between adolescents and emerging adults in terms of reasons for quitting substance use (Smith, Cleeland, & Dennis, 2010) and treatment outcomes (Smith, Godley, Godley, & Dennis, 2011), the current study sought to address two aims.

The primary aim was to examine the relationship between child maltreatment and several important SUD treatment outcomes (substance use, substance-related problems, emotional problems, social risk, recovery environment risk, and HIV risk behavior; Garner, Hunter, Modisette, Ihnes, & Godley, 2012; Lennox, Dennis, Ives, & White, 2006). This aim is important as it helps address the extent to which SUD treatment may be able to benefit emerging adults and adolescents who have experienced child maltreatment. A secondary aim was to examine the extent to which the relationships between child maltreatment and these SUD treatment outcomes may differ by life stage (adolescent vs. emerging adult).

Method

Data Source

Data for the current study were collected as part of the Assertive Adolescent and Family Treatment (AAFT) project. A detailed description of the AAFT project has been published previously (Godley, Garner, Smith, Meyers, & Godley, 2011). Briefly, AAFT was a national initiative funded by the Substance Abuse and Mental Health Services Administration's Center for Substance Abuse Treatment and designed to help improve implementation of the Adolescent Community Reinforcement Approach (A-CRA; Godley et al., 2001) and Assertive Continuing Care (ACC; Godley, Godley, Karvinen, Slown, & Wright, 2006) within real-world practice settings.

A-CRA is an adaptation of the Community Reinforcement Approach (Hunt & Azrin, 1973), which was initially developed and tested with adult samples (e.g., Azrin, Sisson, Meyers, & Godley, 1982; Higgins et al., 1991; Hunt & Azrin, 1973; Smith, Meyers, & Delaney, 1998). It is an individually based behavioral treatment that seeks to use social, recreational, family, school, or vocational reinforcers to help individuals in their recovery process (Meyers & Smith, 1995). A-CRA is intended to be delivered as part of weekly face-to-face sessions that are approximately 1 hr in duration and conducted over an approximately 14-week period. It consists of 19 procedures for adolescents and 21 for emerging adults (e.g., functional analysis of substance use, goals of counseling, drink/drug refusal skills, problem solving, and communication skills) that therapists can draw upon contingent on adolescent-specific goals and skills deficits. ACC is a continuing care version of A-CRA. A key difference is that ACC is typically delivered over an approximate 14-week period in the community (e.g., at client's home) rather than in a clinic setting. In addition to the A-CRA procedures, ACC also includes other case-management activities (e.g., crisis management and linkage and transportation to other recovery support services).

The effectiveness of A-CRA and ACC has been supported in randomized clinical trials (Dennis et al., 2004; Godley, Godley, Dennis, Funk, & Passetti, 2007; Slesnick, Prestopnik, Meyers, & Glassman, 2007). Furthermore, exposure to the above-described A-CRA

treatment procedures has been found to mediate the association between length of treatment and substance use outcomes (Garner et al., 2009). As part of the AAFT project, clients received both A-CRA and ACC. Thus, participating clients received approximately 6 months of treatment. All data in the current study were collected under the auspices of each participating treatment organization's respective institutional review board.

Study Sample

The current study focused on the 36 treatment organizations that provided treatment to both emerging adults and adolescents. These 36 community-based treatment organizations represented the following regions of the United States: Midwest (8%), New England (6%), Middle Atlantic (8%), South Atlantic (14%), South Central (11%), South West (11%), West Mountain (17%), and Pacific West (25%). Collectively, these organizations contributed a total of 3,705 unique clients. This intent-to-treat sample of 3,705 clients included 926 emerging adults (i.e., 18–25 years of age; 25%) and 2,779 adolescents (i.e., 12–17 years of age; 75%). On average, the 926 emerging adults received 7.05 A-CRA sessions ($SD = 4.94$) and 3.04 ACC sessions ($SD = 3.76$) and the 2,779 adolescent received 7.43 A-CRA sessions ($SD = 5.28$) and 3.28 ACC sessions ($SD = 4.36$).

Of the 926 emerging adults, 825 (89%) completed a 3-month follow-up interview and 714 (77%) completed a 6-month follow-up interview. Of the 2,779 adolescents, 2,625 (94%) completed a 3-month follow-up interview and 2,228 (80%) completed a 6-month follow-up interview. Attrition analyses did not reveal any differences between emerging adults who did not complete a follow-up interview and emerging adults who did complete at least one follow-up interview. Attrition analyses did reveal, however, that relative to adolescents who did complete at least one follow-up interview, those adolescents who did not complete at least one follow-up interview ($n = 82$) were less severe in terms of baseline measures of recovery environment risk and emotional problems. For growth curve analyses (see Analytic Plan section for more details), we limited the samples to those clients who had at least one follow-up assessment (i.e., either 3- or 6-month post-intake follow-up). This process resulted in a total of 3,555 clients (96% of possible sample), which was composed of 858 emerging adults (93% of possible sample) and 2,697 adolescents (97% of possible sample). Baseline characteristics for this sample of emerging adults and adolescents are presented in Table 1.

Measures

Baseline and follow-up (i.e., 3 and 6 months postbaseline) data for the present study were collected using the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, White, Unsicker, & Hodgkins, 2003). The GAIN has been normed on both adults and adolescents. The GAIN's main scales have been shown to demonstrate good internal consistency (with α s greater than .90 on main scales and .70 on subscales) and 1-week test-retest reliability (ρ s greater than .70 on days/problem counts, κ s greater than .60 on categorical measures) and to be highly correlated with measures of use based on timeline follow-back methods, urine tests, collateral reports, treatment records, and blind psychiatric diagnosis (ρ of .70 or more, κ of .60 or more; Dennis et al., 2003).

Emerging adult group—An indicator variable was created to partition the entire sample of 3,555 into adolescents and emerging adults (1 = 18–25 years of age [i.e., emerging adults]; 0 = 17 and under [i.e., adolescents]).

Child maltreatment—Five items were used to create a dichotomous measure called Child/adolescent maltreatment (0 = *no* and 1 = *yes*). These items included “has anyone ever...”

(a) “attacked you with a gun, knife, stick, bottle or other weapon?” (b) “hurt you by striking or beating you to the point that you had bruises, cuts, or broken bones or otherwise physically abused you?” (c) “abused you emotionally; that is, did or said things to make you feel very bad about yourself or your life?” and (d) “pressured or forced you to participate in sexual acts against your will, including your regular sex partner, a family member or friend?” Additionally, clients were asked how old they were (in years) the first time any of these things happened to them. If individuals answered “yes” to any of the above-mentioned four questions and indicated that the first time any of these things happened was age 17 or younger, they were classified into the child maltreatment group. Information about the perpetrator was not available, thus this measure represents a more global view of child maltreatment.

Percentage of days using substances—This variable was the percentage of days out of the past 90 days that each client reported using alcohol or other drugs, while controlling for days in controlled environments such as jail, prison, or residential treatment.

Substance Problems Scale ($\alpha = .89$)—A count (ranging from 0 to 16) was made of the number of various types of problems related to substance use that a client endorsed having in the past month, including *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition, Text Revision) symptoms of SUDs and substance-induced disorders. Higher scores on this scale represent greater severity of drug problems.

Emotional Problems Scale ($\alpha = .79$)—This scale was an average of 7 items (divided by their range): (a) recency of mental health problems, memory problems, and behavioral problems; (b) days (during the past 90 days) of being bothered by mental problems, memory problems, and behavioral problems; and (c) the days the problems kept the participant from meeting his or her responsibilities. Values range from 0 to 1, with higher values indicating greater severity.

Social risk index—A sum of 7 items, this index assessed how many individuals (0 = *none*, 1 = *a few*, 2 = *some*, 3 = *most*, and 4 = *all*) the respondent hung out with socially who were involved in school, training, illegal activities, substance use, treatment, or in recovery in the past 90 days. Positive items (school, training, treatment, and recovery) were reversed. Values are summed so that the scores range from 0 to 28, with higher values indicating more time with individuals in their social environment who were using alcohol/drugs, were involved in illegal activity, argued, or were not in school or work.

Recovery environment risk index—This 12-item summative measure assessed the number of days out of the past 90 days or recency of homelessness; living with alcohol or drug use in the home; violent arguments; physical, emotional, or sexual victimization; structured activities involving alcohol or drugs; structured activities not involving alcohol or drugs; and self-help group attendance. The last 2 positive items were reversed and each item was divided by its range so that the sum ranged from 0 to 1. Higher scores indicate less involvement in support groups (e.g., alcoholics anonymous, cocaine anonymous, and narcotics anonymous) and more environmental risk from alcohol/drug use in the home, fighting, and/or victimization.

HIV risk index—This scale measures how much an individual was exposed to situations or engaged in behaviors that increase the likelihood of contracting or spreading HIV. This index is the sum of seven dichotomies across any of the following risk behaviors in the past 90 days: any needle use, any sharing of needles, sexually active, any unprotected sex, multiple sex partners, victimized in the past 90 days, and currently worried about being victimized.

Analytic Plan

In addition to the low rate of missing follow-up observations (see Study Sample section), there was a low rate of missing items (ranged from 0% to 6% for study items). Hot deck imputation (e.g., Figueredo, McKnight, McKnight, & Sidani, 2000; Little & Rubin, 1989) was used to impute any missing items. Data were imputed within group (emerging adults and adolescents) and within time point (baseline, 3-month follow-up, and 6-month follow-up). Procedurally, after the data were sorted by organization, gender, race, and age, the mean of the four closest records were used to impute any missing items.

HLM software Version 6.08 (Raudenbush, Bryk, & Congdon, 2004), which is well suited for multilevel growth curve analyses (Raudenbush & Bryk, 2002), was used to simultaneously examine the differences in intercepts and slopes. Latent growth curves for each outcome measure were modeled so that the intercept represented the baseline value for the outcome variable and the slope represented change over the three follow-up time points (i.e., baseline, 3-month postbaseline, and 6-month postbaseline). HLM software uses maximum likelihood estimation (Myung, 2003) to estimate missing values within the growth curve.

Finally, in order to increase the precision and specification of the models analyzed in this study, several measures shown to differ between emerging adults and adolescents at intake (see Table 1) were included as model covariates: race, prior substance use treatment, and years of substance use. Race was coded so that Caucasian participants were the reference group with indicators for African American, Hispanic, mixed, and other races. Prior SUD treatment was coded as a dichotomous indicator (1 = *yes* and 0 = *no*) of whether or not the participant had ever received treatment for substance use prior to the current treatment episode. Years of substance use was a continuous variable calculated as the difference between current age and age of first substance use.

Results

Table 2 presents the results of each of the latent growth curve analyses, all of which controlled for participants' life stage (i.e., adolescent vs. emerging adult), race, years of substance use, and prior SUD treatment. These adjusted analyses indicated that relative to individuals who did not report child maltreatment at baseline, those reporting child maltreatment at baseline reported significantly higher baseline levels for percentage of days using alcohol and other drug (AOD), substance-related problems, emotional problems, HIV risk, social risk, and recovery environment risk. Additionally, the interaction between emerging adulthood and child maltreatment was significant for two of the six outcomes. Specifically, emerging adults who experienced childhood maltreatment reported significantly higher emotional problems and significantly lower HIV risk at baseline.

In terms of changes over time in these SUD treatment outcomes (i.e., model for slopes), analyses (adjusted for race, years of substance use, and prior SUD treatment) indicated that relative to individuals who did not report child maltreatment at baseline, those experiencing child maltreatment reported significantly greater reductions in percentage of days using AOD, substance-related problems, emotional problems, HIV risk, and recovery environment risk. Although similar results were found for social risk, this relationship did not reach statistical significance ($p = .06$). Overall, these relationships between child maltreatment and SUD treatment outcomes did not significantly differ between adolescents and emerging adults, with the exception of HIV risk (see Figure 1).

Discussion

The primary aim of the current study was to examine the relationship between child maltreatment and treatment outcomes among emerging adults and adolescents in SUD treatment. In terms of baseline severity, both emerging adults and adolescents who reported child maltreatment at the baseline assessment also reported significantly more severe baseline problems in terms of their substance use, substance-related problems, emotional problems, HIV risk, social risk, and recovery environment risk. This is consistent with an extensive body of research showing that individuals who experience child maltreatment often have significant life–health problems (Cicchetti & Toth, 2005; Huang et al., 2011; Lo & Cheng, 2007; Simpson & Miller, 2002; Smith et al., 2005). We also found that the positive baseline association between child maltreatment and emotional problems was significantly stronger for emerging adults, but that the significant positive relationship between child maltreatment and HIV risk was significantly stronger for adolescents.

It is possible that adolescents' closer age proximity to their childhood maltreatment may have led to increased HIV risk behavior through increased antisocial behavior and emotional dysregulation, which are known to occur for maltreated adolescents (Mezzich et al., 1997) and also to be associated with HIV risk behaviors (e.g., unprotected sex). Furthermore, externalizing disorders are more common among adolescents in substance use treatment, but internalizing disorders are more common for emerging adults (Chan, Dennis, & Funk, 2008). Although the specific pathways through which this occurs for youth in treatment are yet unknown, our findings are consistent with prior literature and suggest that child

maltreatment may potentially account for differences in clinical presentations that have been observed for emerging adults and adolescents (Dennis, White, & Ives, 2009). Given the limited research that has examined the differences between adolescents and emerging adults, particularly with regard to the relationship between child maltreatment and other important problem areas, there is a need for future research to examine the extent to which these findings replicate using data from other samples.

In terms of change over time, we found that both emerging adults and adolescents who reported child maltreatment at baseline experienced significantly greater reductions over time with regard to their substance use, substance-related problems, emotional problems, HIV risk, and recovery environment risk. These findings are consistent with research by Funk, McDermeit, Godley, and Adams (2003) and Shane, Diamond, Mensinger, Shera, and Wintersteen (2006), who each found evidence that adolescents with higher levels of victimization had greater reductions in substance use relative to similar adolescents with lower levels of victimization. Together, these findings are encouraging, as they suggest SUD treatment may be particularly beneficial for emerging adults and adolescents who have experienced child maltreatment. Consequently, additional emphasis on coordination of services between child welfare and substance treatment organizations may be warranted.

A secondary aim of the current study was to examine the extent to which the relationships between child maltreatment and these treatment outcomes may differ between emerging adults and adolescents. Overall, interaction analyses did not support differential relationships between child maltreatment and changes over time in these SUD treatment outcomes. One exception, however, was that although emerging adults with child maltreatment did reduce their HIV risk over time, their improvements were not as great as were the improvements in HIV risk reported by adolescents who had experienced child maltreatment. This finding is similar to other research that has shown that age moderates the relationship between substance use and HIV risk (Kingree & Phan, 2001).

Strengths and Limitations

The study's large sample, longitudinal design, and high follow-up rate represent important study strengths. The study also had a number of important limitations that should be acknowledged. First, all study data were based on participant self-report. Second, information regarding child neglect, experience in foster care, or the perpetrator of the maltreatment was not available, nor was information regarding the severity of maltreatment. Third, since the item pertaining to the onset of child maltreatment only asked how old the individuals were when they faced any maltreatment (physical, emotional, and sexual) for the first time, we had limited ability to distinguish between the onset and sequencing of different types of child maltreatment. Fourth, given that 2 of the 12 items on the recovery environment risk index focused on victimization, we recognize that there is some overlap between the baseline measure of child maltreatment and baseline recovery environment risk. Fifth, given our sample included an overrepresentation of Hispanics, it is not known to what extent the current findings will generalize to more nationally representative samples. Finally, given the follow-up was limited to the 6-month of the treatment period, the long-term sustainability of changes could not be assessed.

General Conclusions and Directions for Future Research

In conclusion, we found both emerging adults and adolescents who reported having experienced child maltreatment had significantly greater baseline problem severity (relative to adolescents and emerging adults who had not experienced child maltreatment), which supports the clinical relevance of screening and assessing individuals for histories of child maltreatment. Additionally, we found that even after adjusting for this and other baseline differences, both emerging adults and adolescents with histories of child maltreatment reported significantly greater reductions (relative to those without histories of child maltreatment) across all but one of the treatment outcomes examined. We found only limited evidence, however, that the relationship between child maltreatment and treatment outcomes differed by life stage (i.e., adolescents vs. emerging adults). These findings are important as they contribute to the relatively limited knowledge base regarding the link between child maltreatment and outcomes during emerging adulthood, which is the focus of the current special issue. The finding related to greater reductions among individuals with comorbid SUD and child maltreatment may be especially important given it provides preliminary evidence that SUD treatment for emerging adults and adolescents who have experienced child maltreatment may be both clinically effective and cost effective. Such questions, however, should be addressed as part of future experimental research using randomized designs. Future research testing mediators of the relationship between child maltreatment and treatment outcomes is also needed, as targeting potential change mechanisms may lead to even greater improvements in treatment outcomes.

Acknowledgments

Funding

This work was supported by the National Institute on Drug Abuse (R01-DA030462), the National Institute on Alcohol Abuse and Alcoholism (K23-AA017702), and the Substance Abuse and Mental Health Services Administration's Center for Substance Abuse Treatment (contract no. 270-07-0191).

References

- Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*. 2000; 55:469–480. [PubMed: 10842426]
- Arnett JJ. The developmental context of substance use in emerging adulthood. *Journal of Drug Issues*. 2005; 35:235–254.
- Azrin NH, Sisson RW, Meyers RJ, Godley MD. Outpatient alcoholism treatment by community reinforcement and disulfiram therapy. *Journal of Behavior Therapy and Experimental Psychiatry*. 1982; 13:105–112. [PubMed: 7130406]
- Briere J, Elliott DM. Prevalence and psychological sequelae of self-reported childhood physical and sexual abuse in a general population sample of men and women. *Child Abuse & Neglect*. 2003; 27:1205–1222. [PubMed: 14602100]
- Carson DC, Sullivan CJ, Cochran JK, Lersch KM. General strain theory and the relationship between early victimization and drug use. *Deviant Behavior*. 2009; 30:54–88.
- Chan YF, Dennis ML, Funk RR. Prevalence and comorbidity of major internalizing and externalizing problems among adolescents and adults presenting to substance abuse treatment. *Journal of Substance Abuse Treatment*. 2008; 34:14–24. [PubMed: 17574804]
- Cicchetti D, Toth SL. Child maltreatment. *Annual Reviews in Clinical Psychology*. 2005; 1:409–438.

- Currie J, Widom CS. Long-term consequences of child abuse and neglect on adult economic well-being. *Child Maltreatment*. 2010; 15:111–120. [PubMed: 20425881]
- Dennis ML, Godley SH, Diamond G, Tims FM, Babor T, Donaldson J, Funk RR. The Cannabis Youth Treatment (CYT) Study: Main findings from two randomized trials. *Journal of Substance Abuse Treatment*. 2004; 27:197–213. [PubMed: 15501373]
- Dennis, ML.; Titus, JC.; White, M.; Unsicker, J.; Hodgkins, D. Global Appraisal of Individual Needs (GAIN): Administration guide for the GAIN and related measures. Bloomington, IL: Chestnut Health Systems; 2003.
- Dennis, ML.; White, M.; Ives, ML. Individual characteristics and needs associated with substance misuse of adolescents and young adults in addiction treatment. In: Leukefeld, C.; Gullotta, T.; Tindall, MS., editors. *Adolescent substance abuse: Evidence-based approaches to prevention and treatment*. New York, NY: Springer; 2009. p. 45-72.
- Diaz A, Simantov E, Rickert VI. Effect of abuse on health: Results of a national survey. *Archives of Pediatric and Adolescent Medicine*. 2002; 156:811–817.
- Figueredo AJ, McKnight PE, McKnight KM, Sidani S. Multivariate modeling of missing data within and across assessment waves. *Addiction*. 2000; 95:S361–S380. [PubMed: 11132363]
- Finkelhor D, Ormrod R, Turner H, Hamby SL. The victimization of children and youth: A comprehensive, national survey. *Child Maltreatment*. 2005; 10:5–25. [PubMed: 15611323]
- Funk RR, McDermeit M, Godley SH, Adams L. Maltreatment issues by level of adolescent substance abuse treatment: The extent of the problem at intake and relationship to early outcomes. *Child Maltreatment*. 2003; 8:36–45. [PubMed: 12568503]
- Garner BR, Godley SH, Funk RR, Dennis ML, Smith JE, Godley MD. Exposure to adolescent community reinforcement approach treatment procedures as a mediator of the relationship between adolescent substance abuse treatment retention and outcome. *Journal of Substance Abuse Treatment*. 2009; 36:252–264. [PubMed: 18715742]
- Garner BR, Hunter BD, Modisette KC, Ihnes PC, Godley SH. Treatment staff turnover within organizations implementing evidence-based practices: Turnover rates and their association with client outcomes. *Journal of Substance Abuse Treatment*. 2012; 42:134–142. [PubMed: 22154040]
- Godley MD, Godley SH, Dennis ML, Funk R, Passetti L. The effect of Assertive Continuing Care on continuing care linkage, adherence and abstinence following residential treatment for adolescents with substance use disorders. *Addiction*. 2007; 102:81–93. [PubMed: 17207126]
- Godley SH, Garner BR, Smith JE, Meyers RJ, Godley MD. A large-scale dissemination and implementation model for evidence-based treatment and continuing care. *Clinical Psychology: Science and Practice*. 2011; 18:67–83. [PubMed: 21547241]
- Godley, SH.; Godley, MD.; Karvinen, T.; Slown, LL.; Wright, KL. The Assertive Continuing Care Protocol: A clinician's manual for working with adolescents after residential treatment of alcohol and other substance use disorders. Bloomington, IL: Lighthouse Institute; 2006.
- Godley, SH.; Meyers, RJ.; Smith, JE.; Godley, MD.; Titus, JC.; Karvinen, T.; Kelberg, P. Adolescent community reinforcement approach (ACRA) for adolescent cannabis users: cannabis youth treatment (CYT) manual series (vol. 4). Rockville, MD: Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration; 2001.
- Grella CE, Joshi V. Treatment processes and outcomes among adolescents with a history of abuse who are in drug treatment. *Child Maltreatment*. 2003; 8:7–18. [PubMed: 12568501]
- Hahm HC, Lee Y, Ozonoff A, Van Wert MJ. The impact of multiple types of child maltreatment on subsequent risk behaviors among women during the transition from adolescence to young adulthood. *Journal of Youth and Adolescence*. 2010; 39:528–540. [PubMed: 20020190]
- Higgins ST, Delaney DD, Budney AJ, Buckle WK, Hughes JR, Foerg F, Fenwick JW. A behavioral approach to achieving initial cocaine abstinence. *American Journal of Psychiatry*. 1991; 148:1218–1224. [PubMed: 1883001]
- Huang S, Trapido E, Fleming L, Arheart K, Crandall L, French M, Prado G. The long-term effects of childhood maltreatment experience on subsequent illicit drug use and drug-related problems in young adulthood. *Addictive Behaviors*. 2011; 36:95–102. [PubMed: 20947260]
- Hunt GM, Azrin NH. A community-reinforcement approach to alcoholism. *Behavior Research and Therapy*. 1973; 11:91–104.

- Hussey JM, Chang JJ, Kotch JB. Child maltreatment in the United States: Prevalence, risk factors, and adolescent health consequences. *Pediatrics*. 2006; 118:933–942. [PubMed: 16950983]
- Kingree JB, Phan DL. Marijuana use and HIV risk among adolescent offenders: The moderating effect of age. *Journal of Substance Abuse*. 2001; 13:59–71. [PubMed: 11547625]
- Lennox R, Dennis ML, Ives M, White MK. The construct and predictive validity of different approaches to combining urine and self-reported drug use measures among older adolescents after substance abuse treatment. *American Journal on Addictions*. 2006; 15:92–101. [PubMed: 17182424]
- Little RJA, Rubin DB. The analysis of social science data with missing values. *Sociological Methods and Research*. 1989; 18:292–326.
- Lo CC, Cheng TC. The impact of childhood maltreatment on young adults' substance abuse. *The American Journal of Drug and Alcohol Abuse*. 2007; 33:139–146. [PubMed: 17366254]
- Meyers, RJ.; Smith, JE. *Clinical guide to alcohol treatment: The community reinforcement approach*. New York, NY: Guilford Press; 1995.
- Mezzich AC, Tarter RE, Giancola PR, Lu S, Kirisci L, Parks S. Substance use and risky sexual behavior in female adolescents. *Drug and Alcohol Dependence*. 1997; 44:157–166. [PubMed: 9088788]
- Myung J. Tutorial on maximum likelihood estimation. *Journal of Mathematical Psychology*. 2003; 47:90–100.
- Nikulina V, Widom CS. Child maltreatment and executive functioning in middle adulthood: A prospective examination. *Neuropsychology*. 2013; 27:417–427. [PubMed: 23876115]
- Raudenbush, SW.; Bryk, AS. *Hierarchical linear models*. Thousand Oaks, CA: Sage; 2002.
- Raudenbush, SW.; Bryk, AS.; Congdon, R. *HLM 6 for Windows* [Computer software]. Lincolnwood, IL: Software International, Inc.; 2004.
- Sacks JY, McKendrick K, Banks S. The impact of early trauma and abuse on residential substance abuse treatment outcomes for women. *Journal of Substance Abuse Treatment*. 2008; 34:90–100. [PubMed: 17574799]
- Sedlak, AJ.; Mettenberg, J.; Basena, M.; Petta, I.; McPherson, K.; Greene, A.; Li, S. *Fourth National Incidence Study of Child Abuse and Neglect (NIS-4): Report to Congress, executive summary*. Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families; 2010.
- Shane P, Diamond GS, Mensinger JL, Shera D, Wintersteen MB. Impact of victimization on substance abuse treatment outcomes for adolescents in outpatient and residential substance abuse treatment. *The American Journal on Addictions*. 2006; 15:34–42. [PubMed: 17182418]
- Shin SH, Hong HG, Wills TA. An examination of pathways from childhood maltreatment to adolescent binge drinking. *The American Journal on Addiction*. 2012; 21:202–209.
- Shin SH, Miller DP, Teicher MH. Exposure to childhood neglect and physical abuse and developmental trajectories of heavy episodic drinking from early adolescence into young adulthood. *Drug and Alcohol Dependence*. 2013; 127:31–38. [PubMed: 22749563]
- Simpson TL, Miller WR. Concomitance between childhood sexual and physical abuse and substance use problems: A review. *Clinical Psychology Review*. 2002; 22:27–77. [PubMed: 11793578]
- Slesnick N, Prestopnik JL, Meyers RJ, Glassman M. Treatment outcome for street-living, homeless youth. *Addictive Behaviors*. 2007; 32:1237–1251. [PubMed: 16989957]
- Smith CA, Ireland TO, Thornberry TP. Adolescent maltreatment and its impact on young adult antisocial behavior. *Child Abuse & Neglect*. 2005; 29:1099–1119. [PubMed: 16233913]
- Smith DC, Cleeland L, Dennis ML. Reasons for quitting among emerging adults and adolescents in substance-use-disorder treatment. *Journal of Studies on Alcohol and Drugs*. 2010; 71:1–10.
- Smith DC, Godley SH, Godley MD, Dennis ML. Adolescent Community Reinforcement Approach outcomes differ among emerging adults and adolescents. *Journal of Substance Abuse Treatment*. 2011; 41:422–430. [PubMed: 21831564]
- Smith JE, Meyers RJ, Delaney HD. The community reinforcement approach with homeless alcohol-dependent individuals. *Journal of Consulting and Clinical Psychology*. 1998; 66:541–548. [PubMed: 9642893]

- Substance Abuse and Mental Health Services Administration. Identifying mental health and substance use problems of children and adolescents: A guide for child-serving organizations. Rockville, MD: Author; 2011. (HHS Publication No. SMA 12-4670).
- Titus JC, Dennis ML, White WL, Scott CK, Funk RR. Gender differences in victimization severity and outcomes among adolescents treated for substance abuse. *Child Maltreatment*. 2003; 8:19–35. [PubMed: 12568502]
- United States Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. Child maltreatment 2012. 2013. Retrieved from <http://www.acf.hhs.gov/programs/cb/research-data-technology/statistics-research/child-maltreatment>
- Widom CS, Marmorstein NR, White HR. Childhood victimization and illicit drug use in middle adulthood. *Psychology of Addictive Behaviors*. 2006; 20:394–403. [PubMed: 17176174]
- Widom CS, Weiler BL, Cottler LB. Childhood victimization and drug abuse: A comparison of prospective and retrospective findings. *Journal of Consulting and Clinical Psychology*. 1999; 67:867–880. [PubMed: 10596509]
- Widom CS, White HR, Czaja SJ, Marmorstein NR. Long-term effects of child abuse and neglect on alcohol use and excessive drinking in middle adulthood. *Journal of Studies on Alcohol and Drugs*. 2007; 68:317–326. [PubMed: 17446970]
- Wilson HW, Widom CS. An examination of risky sexual behavior and HIV in victims of child abuse and neglect: A 30-year follow-up. *Health Psychology*. 2008; 27:149–158. [PubMed: 18377133]
- Wilson HW, Widom CS. Pathways from childhood abuse and neglect to HIV-risk sexual behavior in middle adulthood. *Journal of Consulting and Clinical Psychology*. 2011; 79:236–246. [PubMed: 21355638]

Figure 1.

Differential relationship between child maltreatment and changes in HIV risk for adolescents and emerging adults.

Note. Analysis controlled for client's race, years of substance use, and prior substance use treatment.

Table 1

Baseline Characteristics for Adolescents and Emerging Adults.

	Adolescents (<i>n</i> = 2,697)		Emerging adults (<i>n</i> = 858)	
	Mean, %	SD, Count	Mean, %	SD, Count
Female	21.9%	311	25.4%	178
Race				
African American *	12.4%	333	20.0%	171
Caucasian	26.5%	710	22.5%	192
Hispanic	42.7%	1,147	40.8%	349
Mixed	12.3%	329	13.7%	117
Other	6.1%	165	3.0%	26
Single-parent family	50.7%	1,354	NA	NA
Current criminal justice involvement	65.9%	1767	69.5%	594
Years of substance use *	3.04	2.1	5.92	3.22
Prior substance use treatment *	32.1%	866	43.1%	370
Child maltreatment	54.8%	1,477	58.0%	498
Traumatic stress disorder *	20.8%	557	28.9%	246
Major depressive disorder *	29.7%	797	38.1%	325
Generalized anxiety disorder *	9.9%	265	17.9%	153
Conduct disorder *	42.6%	1,144	28.8%	245
Percentage of days using substances	36.6%	36.7%	39.4%	38.3%
Substance Problem Scale	2.47	3.30	2.69	3.95
Emotional Problems Scale *	10.35	16.45	20.86	21.92
HIV risk index *	1.56	1.34	1.98	1.30
Social risk index	13.06	4.32	12.94	4.55
Recovery environment risk index *	11.08	12.49	20.42	12.34

Note. NA = not applicable.

* $p < .05$.

Table 2
Intercept- and Slopes-as-Outcome Results From Multilevel Growth Curve Analyses.

	Percentage of days using substances		Substance Problem Scale		Emotional Problems Scale	
	COF	(SE)	COF	(SE)	COF	(SE)
Coefficients for intercepts						
Intercept	0.248*	(0.020)	1.692*	(0.174)	0.166*	(0.011)
EA	-0.044	(0.023)	-0.154	(0.213)	-0.016	(0.012)
CM	0.082*	(0.013)	0.839*	(0.125)	0.099*	(0.007)
EA × CM	-0.046	(0.027)	0.372	(0.249)	0.026*	(0.013)
Prior substance use Tx	0.010	(0.013)	-0.064	(0.118)	0.008	(0.006)
Years of substance use	0.017*	(0.002)	0.072*	(0.023)	0.009*	(0.001)
African American	0.009	(0.020)	-0.454*	(0.183)	-0.040*	(0.010)
Hispanic	0.036*	(0.017)	0.213	(0.159)	-0.040*	(0.009)
Mixed	-0.030	(0.020)	-0.242	(0.189)	0.004	(0.010)
Other race	-0.041	(0.032)	-0.287	(0.292)	-0.051*	(0.016)
Random effect variance	0.064		5.207		0.014	
Coefficients for slopes						
Intercept	-0.021*	(0.003)	-0.190*	(0.030)	-0.004*	(0.001)
EA	0.005	(0.004)	-0.018	(0.042)	0.000	(0.002)
CM	-0.005*	(0.003)	-0.073*	(0.027)	-0.007*	(0.001)
EA × CM	0.005	(0.006)	-0.059	(0.053)	-0.001	(0.003)
Prior substance use Tx	0.010*	(0.003)	0.126*	(0.025)	0.000	(0.001)
Years of substance use	-0.002*	(0.001)	-0.002	(0.005)	-0.001*	(0.000)
African American	-0.002	(0.004)	0.074*	(0.037)	0.001	(0.002)
Hispanic	-0.012*	(0.003)	-0.032	(0.028)	0.000	(0.001)
Mixed	0.002	(0.004)	0.040	(0.039)	-0.004*	(0.002)
Other race	0.007	(0.006)	0.109*	(0.053)	0.002	(0.003)
Random effect variance	0.672		6.541		0.002	

	HIV Risk Index		Social Risk Index		Recovery Environment Risk Index	
	COF	(SE)	COF	(SE)	COF	(SE)
Coefficients for intercepts						
Intercept	0.803*	(0.062)	11.562*	(0.232)	0.209*	(0.004)
EA	0.359*	(0.078)	-0.419	(0.273)	0.001	(0.005)
CM	0.719*	(0.046)	1.141*	(0.159)	0.057*	(0.003)
EA × CM	-0.386*	(0.092)	0.162	(0.317)	-0.006	(0.005)
Prior substance use Tx	0.079	(0.044)	0.249	(0.151)	-0.010*	(0.003)
Years of substance use	0.060*	(0.008)	0.143*	(0.029)	0.003*	(0.000)
African American	0.213*	(0.068)	0.201	(0.234)	-0.007	(0.004)
Hispanic	0.246*	(0.059)	0.400	(0.206)	-0.013*	(0.004)
Mixed	0.142*	(0.070)	0.486*	(0.242)	0.000	(0.004)
Other race	-0.076	(0.107)	-0.517	(0.378)	-0.019*	(0.006)
Random effect variance	0.672		6.541		0.002	
Coefficients for slopes						
Intercept	0.010	(0.011)	-0.084*	(0.040)	-0.001	(0.001)
EA	-0.024	(0.016)	0.105	(0.058)	0.000	(0.001)
CM	-0.082*	(0.010)	-0.068	(0.036)	-0.006*	(0.001)
EA × CM	0.052*	(0.020)	-0.080	(0.072)	0.001	(0.001)
Prior substance use Tx	0.027*	(0.009)	-0.001	(0.033)	0.003*	(0.001)
Years of substance use	-0.004*	(0.002)	-0.012	(0.007)	0.000	(0.000)
African American	-0.024	(0.014)	0.004	(0.051)	0.000	(0.001)
Hispanic	-0.029*	(0.010)	-0.042	(0.038)	0.002*	(0.001)
Mixed	-0.022	(0.014)	-0.072	(0.053)	0.001	(0.001)
Other race	-0.018	(0.020)	0.125	(0.073)	0.002	(0.001)

Note. EA = emerging adult; CM = child maltreatment; Tx = treatment, COF = coefficient, SE = standard error.

* $p < .05$.