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Drug Refusal Skills Training Does not Enhance Outcomes of African American Adolescents with Substance Use Problems

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Abstract

In prior research by Witkiewitz and colleagues, African American adults receiving refusal skills training (RST) had fewer heavy drinking days and were categorized as having more successful outcomes. This study extends findings to adolescents receiving the Adolescent Community Reinforcement Approach (A-CRA). Propensity score matching was used to create three groups equivalent on baseline characteristics, including: African Americans receiving refusal skills training (AA+RST; n=214), African Americans not receiving RST (AA-RST; n=212), and Caucasians receiving RST (CA+RST; n=214). In propensity weighted regression models that controlled for overall A-CRA exposure, racial group by RST status was not a significant predictor of substance use frequency or abstinence/early remission outcomes. Higher exposure to A-CRA, however, was a significant predictor of both outcomes. Universal receipt of RST may not improve the outcomes of African American adolescents with substance use problems, and outcomes may be driven more by the overall number of A-CRA procedures received.

1.0 Introduction

There is continued concern about whether or not interventions for adolescent substance use disorders are equally effective for individuals from various racial backgrounds (Godley, Hedges and Hunter, 2011). African American adolescents in particular are less likely to complete treatment compared to adolescents from other racial groups (Alegria, Carson, Goncalves, & Keefe, 2011; Becker, Stein, Curry, & Hersh, 2012; Campbell, Weisner, & Sterling, 2006; White, Haas, & Williams, 2012), but it appears that their treatment outcomes have not suffered as a result of this discrepancy (Alegria et al., 2011; Becker et al., 2012; Godley et al., 2011, Schmidt, Greenfield, Mulia, 2006). Nevertheless, as African American youth with substance use problems experience greater social, economic, and health consequences than their White counterparts (Schmidt, Greenfield, & Mulia 2006), investigations of promising approaches that may improve their outcomes are very important.

To our knowledge, no existing studies have isolated the effects of specific therapeutic procedures within empirically supported treatments for racially diverse adolescents with substance use disorders. However, recent research found that African American adults with alcohol use disorders benefitted more from a multicomponent behavioral intervention

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(Miller, 2004) when it included drink refusal skills training (RST), a skills training procedure where individuals role-played turning down drink offers. (A drink or drug offer occurs when an individual in one's social network suggests drinking or using drugs.) Specifically, African Americans receiving RST had fewer heavy drinking days at follow up compared to African Americans that did not receive RST and Caucasians who did (Witkiewitz, Villarreal, Hartzler, & Donovan, 2011). One potential reason there may be differential benefits for African American adults receiving RST is that African American adults were found to have more drink offers than Caucasians (Walton Blow, & Booth, 2001). It is unclear if this is also the case for African American adolescents.

Witkiewitz and colleagues (2011) noted that replication studies are needed due the small sample size of their study (i.e., 60 African Americans). This study attempts to replicate these findings with a large sample of African American adolescents receiving a multicomponent behavioral therapy called the Adolescent Community Reinforcement Approach (A-CRA; Godley, Myers, Smith et al., 2001). If we replicate Witkiewitz and colleagues' (2011) findings, it may imply that refusal skills training should be a routine component for African American adolescents in substance use disorder treatment.

1.1 Improving Treatment Outcomes for Minorities

Three main approaches to addressing the cultural relevance of treatments include ethnic matching, developing culturally specific intervention programs, and identifying differentially effective program components. Some support exists for ethnic matching (Flicker, Waldron, Turner, Brody, & Hops 2008; Wintersteen, Mensinger, & Diamond, 2005), no examples of culturally specific interventions for adolescent substance use disorders could be located, and there is no support for the approach used in the current study, which attempts to isolate components of interventions that improve outcomes for racial minorities. Some treatment components such as refusal skills training (RST) may have differential benefits for racially diverse adolescents with substance use disorders. This may especially be the case if a treatment outcome mediator such as ability to refuse a drug offer or peer substance use, varies by race (Castro, Barrera, & Holleran-Steiker, 2010).

One study found no gender or racial differences found for A-CRA, the treatment under investigation here (Godley et al., 2011) Specifically, Godley and colleagues (2011) examined the equivalence of treatment for both genders and different racial groups, and found no racial differences in treatment initiation, engagement, total sessions attended, or six month abstinence outcomes. African-American youth, however, reported higher treatment satisfaction compared to Caucasian adolescents. Their study design detected average effects for racial groups, rather than effects of receiving different constellations of services, which may vary and interact with race to produce different outcomes.

1.2 Refusal Skills Training for Adolescents

Refusals Skills Training (RST) has long been part of efficacious multicomponent prevention programs serving African American adolescents. (Epstein, Griffin, & Botvin, 2001; Epstein, Bang, & Botvin, 2007; Belgrave, Reed, Plybon, & Cornielle, 2004; Nasim, Belgrave, Corona, & Townsend, 2009; Nasim, Utsey, Corona, & Belgrave, 2006; Cunningham, Walton, Goldstein, Chermack, Shope, Bingham, Zimmerman, & Blow, 2009). One program significantly reduced the odds of drinking for African American and Hispanic youth ($M = 12.87$ years of age) living in low income urban settings (Williams, Epstein, Botvin, Schinke, Diaz, 1998). Further, among younger minority youth ($M = 12.4$ years of age) the ability to assertively refuse drug offers predicts reduced alcohol use (Epstein et al., 2001). These studies, however, are typically limited to the prevention context, mostly do not include comparison groups, and have not attempted to disentangle the effects of RST from other

program components. RST was also part of empirically-supported treatments studied in the largest outcomes trial for adolescents with cannabis use disorders (Dennis, Godley, Diamond, Tims, Babor, Donaldson, et al., 2004). However, this study also did not attempt to disentangle the specific effects of RST or whether RST was differentially beneficial to African Americans.

1.3 Summary and Hypotheses

This study replicates Witkiewitz et al.'s (2011) study by comparing African American adolescents receiving RST, African American adolescents who do not receive RST, and Caucasian adolescents that receive RST. To our knowledge, this is the first study of whether receipt of RST enhances the outcomes of African American adolescents receiving an empirically supported substance use disorder treatment.

Limited research exists to guide a hypothesis about whether we will replicate Witkiewitz et al.'s (2011) findings with adolescents. However, we note that prior research on RST with adolescents did not separate the effects of RST from other components in multicomponent interventions, and that adolescent studies showing racial differences in drug offers are lacking. This is important, as drug offers may be the potential mediating variable through which RST has differential benefits for African Americans. Prior research showing African American adults to have more drug offers than Caucasians provided the rationale for the Witkiewitz et al. (2011) study. Thus, we hypothesize that we will not replicate these findings for adolescents in light of no literature support for racial differences in drug offers among adolescents. As a secondary and exploratory hypothesis, we investigated whether there were racial differences in peer substance use. There is limited literature support to guide such a hypothesis, so we did not predict whether peer substance use would be higher or lower for African American youth.

2.0 Method

2.1 Data Source

Data were obtained from 37 SAMHSA-funded outpatient treatment sites implementing the Adolescent Community Reinforcement Approach (A-CRA; S. H. Godley et al., 2001; S. H. Godley, Smith, Meyers, & Godley, 2009). Sites were spread throughout all regions of the United States, with most participants drawn from metropolitan areas with populations larger than 250,000 (83.5%), and the balance from smaller cities and rural areas (16.5%). IRB approval was obtained locally, and HIPAA-compliant data sharing procedures were used. Agencies were trained and certified in A-CRA (S. H. Godley, Garner, Smith, Meyers, & Godley, 2011), as well as in data collection using the Global Appraisal of Individual Needs (Dennis, Titus, White, Unsicker, & Hodgkins, 2002).

Out of 1757 cases available (572 African American youth, 1185 non-Hispanic Caucasian youth) at the time of this study, we selected cases that had completed at least one follow up interview at either 3 or 6 months post-intake. We excluded 57 cases due to lack of follow up data (3.2%) and five cases (.02%) due to missing indicators of racial background or completion of the RST module. Only 4% of African Americans and 2.9% of Caucasians failed to complete at least one follow up assessment at either three or six months. Propensity score matching (see below) was used to create smaller comparison groups with equivalent baseline characteristics including: African American youth receiving refusal skills training (AA+RST; N=214), African American youth who did not receive RST, (AA-RST, N=212), and Caucasians that received RST (CA+RST: n= 214).

2.1.1 Participants—Participants were mainly male (83%), and the average age (in years) across comparison groups was 16.3 ($SD = 1.75$). On average, participants were abstinent on 61.4 days ($SD = 31.1$) of the 90 days prior to the baseline assessment. Regarding substance use disorders, 34.8 % met criteria for past year DSM IV dependence diagnoses, 35.8% met criteria for past year substance abuse, and 77.6% met criteria for either lifetime abuse or dependence.

2.1.2 A-CRA Description—The Adolescent-Community Reinforcement Approach (A-CRA) is an individualized, cognitive-behavioral model that aims to make sobriety more rewarding for adolescents (Godley et al., 2001). It is a flexible, manualized approach where clinicians select procedures (e.g. functional analysis of use, happiness scaling and goals of counseling, communications skills training, refusal skills training (RST), job skills training, and caregiver sessions) in response to client needs. Not all clients receive the same A-CRA procedures, enabling this study. The efficacy and cost effectiveness of A-CRA was established in a large randomized trial (Dennis et al., 2004).

2.2 Measures

The GAIN is a reliable and valid semi-structured interview measure (Buchan, Dennis, Tims, & Diamond, 2002; Dennis, Scott, Godley, & Funk, 1999; Dennis, Funk, Godley, Godley, & Waldron, 2004) with an empirically-validated training and supervision process (Titus et al., 2012). The GAIN contains items consistent with the DSM IV (American Psychiatric Association, 2000) criteria for substance use disorders and many common mental health diagnoses. Below we provide detailed information on independent and dependent variables. For matching variable details readers are referred to <http://www.gaincc.org/index.cfm?pageID=43>.

2.2.1 Independent Measures—Two variables were used to develop our categorical groupings of African-Americans receiving refusal skills training (AA+RST), African-Americans who did not receive refusal skills training (AA-RST) and Caucasians that received refusal skills training (CA+RST). First, for every session clinicians indicated what A-CRA procedures they used in a web-based records system. Youth were coded as having received RST if their clinician endorsed the use of it during their treatment episode. (In this sample, 45% of all youth were coded as having received refusal skills training.) Second, self-reported race was collected on the GAIN, which allowed youth to endorse all races with which they identified. Youth were selected for this study if they endorsed African American (0 = no, 1 = yes) or Caucasian (0 = no, 1 = yes). Biracial and multiracial individuals were excluded. Prior to matching, the sample sizes for the three groups were: 214, 335, and 563 for the AA+RST, AA-RST and CA+RST groups.

2.2.2 Dependent Measures: Substance Use Outcomes—Two variables were used to measure substance use outcomes. First, we used the Substance Frequency Scale (SFS), which indicates the average proportion of days (out of the past 90) of any drug use, heavy drug use, days of problems due to use and days of alcohol, marijuana, crack (or powder) cocaine, or heroin use. Values are expressed as decimal values ranging from zero to one with higher values indicating more frequent use (and problems resulting from use) across a variety of substances. Second, a dichotomous (0 = no, 1 = yes) variable indicated whether the participant was *abstinent and in early remission*, as indicated by no past month substance use or SUD criteria, while residing in the community (i.e., not remission while in a controlled environment). This outcome variable has been used in other major clinical trials (Dennis et al., 2004), and eliminates the confound of time spent in controlled environments during the follow up period, which is important because African American youth in

substance abuse treatment are more likely to be incarcerated during post treatment follow up periods (S. H. Godley, Dennis, Godley, & Funk, 2004).

2.2.3 Dependent Measures: Peer Substance Use—To measure peer substance use, we used the GAIN's Social Risk Index (SRI), a 7 item scale asking participants to indicate how many peers (*1 = none to 4 = all; range = 7–28*) attend school or work, have frequent verbal or physical conflicts, use drugs or alcohol, have been in treatment, or consider themselves to be in recovery (reversed). Higher scores indicate more substance use and antisocial behavior by peers.

2.2.4 Variables used in Propensity Matching—Forty-four variables were considered for use in creating a propensity score (Rosenbaum & Rubin, 1983) to control for baseline differences in confounding variables between the AA+RST, AA-RST and CA+RST groups. This wide range of variables (e.g., demographic characteristics, early onset vs. late onset, substance use and psychiatric severity, treatment utilization, motivation for treatment, criminal behavior) were examined due to their associations with treatment outcomes in prior studies, and were included in the propensity score if significant between group differences existed at baseline (i.e., $p < .05$). We matched on 6 and 30 variables for the AA+RST vs. AA-RST and AA+RST vs. CA+RST comparisons, respectively. Table 1 shows pre- and post-matching means of select variables considered for use in propensity score matching. (A full table is available from the first author.)

2.3 Data Analysis Procedures

Following analyses used in other investigations, propensity score weighting was used to create comparison groups of roughly equal size while controlling for differences between groups on baseline variables (D. C. Smith, Godley, Godley, & Dennis, 2011; D. C. Smith, Cleeland, & Dennis, 2010; Subramaniam, Ives, Stitzer, & Dennis, 2010). The propensity scores were calculated using a combination of logistic regression and discriminant function analysis to predict group membership as a function of variables mentioned above. Two separate weights were created to model the differences between the AA+RST and AA-RST groups and the AA+RST and CA+RST groups. Weights were calculated as the propensity score times the sample size of the AA+RST over the sum of the other group's weights. Adding the latter (a constant) does not affect the match but creates roughly equal sample sizes per group for a slightly more conservative test.

After weighting, we used logistic (abstinent/early remission outcome) or linear regression (SFS) to predict outcomes at participants' last available follow up (3 or 6 months post-intake). In our models, we entered RST by racial group as the independent variable (AA+RST = 1, AA-RST = 0, CA+RST = 0) and controlled for the number of days to the follow up interview, any significant differences that remained after matching and the A-CRA exposure scale (AES) score (see below). Using the last available follow up allowed us to reduce bias due to higher missing data at individual waves, and controlling for the length of time from baseline to last follow up reduced the potential confound of differential attrition between groups. Results were similar when we reran analyses using each follow up wave, so we present findings from last follow up.

The A-CRA exposure scale is a validated measure of overall receipt of A-CRA (Garner et al., 2009), indicating the number of A-CRA procedures a client received, excluding RST. Garner et al (2009) found that AES scores higher than 12 increased the chances of achieving abstinence/early remission. Preliminary analyses found equivalent AES scores for both the AA+RST ($M = 12.4$, $SD = 2.8$) and CA+RST ($M = 12.2$, $SD = 2.7$) groups, but not for the AA-RST ($M = 7.9$, $SD = 3.5$) group. Finally, the AES was not used in calculating propensity

scores, which are limited to baseline variables not influenced by treatment processes (Stuart, 2010). Separate regression models were run for the AA+RST versus AA-RST and AA+RST versus CA-RST contrasts.

3.0 Results

3.1 Equivalence of groups prior to and after matching

3.1.1 AA+RST Compared to AA-RST—Only three baseline characteristics significantly differed for these groups prior to matching, including the Problem Orientation Scale (i.e., AA-RST group had higher problem recognition, $d = -.18$), the treatment received scale (i.e., AA-RST had more prior SUD treatment) and weekly alcohol use (10.8% for AA+RST, 5.7% for AA-RST, $p = .027$). After matching there were no statistically significant differences between these groups. Further, across 44 variables considered for matching, the average standardized mean difference (range = .004 to .17) was .06 prior to matching and .05 after matching.

3.1.2 AA+RST Compared to CA+RST—There were 32 statistically significant differences between these groups' baseline characteristics prior to matching. Although most differences were mitigated by matching there remained four statistically significant differences between the AA+RST and CA+RST groups, including: past 90 day welfare receipt (5% for AA+RST, 1% for CA+RST), the number of drug use disorders (i.e., polydrug use higher among CA+RST), the presence of past year dependence (i.e., 31% for AA+RST, 42% for CA+RST), and the presence of any lifetime abuse/dependence diagnoses (i.e., 76% for AA+RST, 85% for CA+RST). We controlled for these variables in the model comparing AA+RST and CA+RST outcomes, as others have done when small effects exist after matching ($|d| > .25$, (Ramchand, Griffin, Suttrop, Harris, & Morral, 2011)). Despite these few differences that we controlled for in our models, the match was successful in reducing bias. The average absolute value of standardized differences for all 44 matching variables was lower after the match ($mean = .075$; $range = .004$ to $.24$) versus before ($mean = .229$).

Regarding our exploratory hypothesis, there was no statistically significant difference in peer substance use at baseline for youth in the AA+RST and CA+RST conditions (See pre-matching SRI values in Table 1). Furthermore, African American youth who did not receive RST (AA-RST) had lower SRI scores relative to the AA+RST participants, but this baseline difference was not statistically significant.

3.2 Substance Use Frequency Outcomes

Separate weighted analyses with AA+RST and AA-RST (Cohen's $d = -.27$, $t = 4.79$, $df = 425$, $p < .001$) and AA+RST and CA+RST (Cohen's $d = -.37$, $t = 7.35$, $df = 427$, $p < .001$) groups revealed statistically significant reductions in substance use frequency (i.e., unadjusted means) for all groups at the last available follow up. Specifically, substance use frequency was reduced by 37.8%, 25.8% and 50.9% for the AA+RST, AA-RST, and CA+RST groups, respectively. These results are displayed in Figure 1.

In the first regression model, group membership in the AA+RST or AA-RST conditions was not a significant predictor of SFS outcomes ($df = 3$, 421 ; $B = .008$; $p = .57$). Intervention exposure (AES) was a significant predictor of SFS ($df = 3$, 421 ; $B = -.006$; $p = .02$). Similarly, in the second regression membership in the AA+RST vs. CA+RST did not predict SFS scores at the last follow up ($df = 6$, 420 ; $B = .013$; $p = .21$). Significant predictors of SFS in the AA+RST versus CA+RST model included AES ($B = -.005$, $p = .049$) and past year substance dependence ($B = .04$, $p = .001$). In short, in both models higher overall intervention exposure was associated with less substance use, and in the AA+RST versus

CA+RST model, participants with past year dependence had higher substance use at follow up.

3.3 Abstinence/Early Remission Outcomes

There were no statistically significant differences between groups in terms of being abstinent and in early remission (i.e., no past month substance use disorder symptoms) while living in the community at the last follow up. This was true for the models comparing AA+RST and AA-RST (Hosmer–Lemeshow $\chi^2 = 2.7$, ns; Nagelkerke $R^2 = .04$; OR = .716; 95% CI = 0.45–1.137); $p = .16$) and AA+RST and CA+RST (Hosmer–Lemeshow $\chi^2 = 4.8$, ns; Nagelkerke $R^2 = .06$; OR = 0.84; 95% CI = 0.56–1.26); $p = .41$) groups. In the AA+RST versus AA-RST model, overall intervention exposure (AES) was a significant predictor of abstinence/early remission (OR = 1.15, (95% CI = 1.06–1.24, $p = .001$). In the AA+RST versus CA+RST model, significant predictors of abstinence/early remission included overall A-CRA procedure exposure (AES; OR = 1.113, (95% CI = 1.01–1.23, $p = .03$) and the presence of any lifetime abuse or dependence diagnosis (OR = .551, (95% CI = .31–.978, $p = .04$). Figure 2 summarizes the percent of each group in early remission at last follow up.

4.0 Discussion

The purpose of this study was to determine if African Americans adolescents receiving RST as part of a multicomponent behavioral intervention would have better outcomes relative to African Americans not receiving RST and Caucasians that received RST. We found support for our (null) hypothesis, as contrary to one prior adult study (Witkiewitz et al., 2011), we found that African American youth receiving RST had no differences in outcomes compared to the AA-RST and CA+RST groups. We offer three potential explanations, including: potential differences between adolescents and adults on drink or drug offers, potential differences in the overall amount of treatment received between the two studies, and potential differences in the quality and amount of RST received in the two studies.

We hypothesized that no outcomes differences would be seen between groups, in part, due to not anticipating differences in drug offers between adolescent racial groups. Although we could not measure drug offers directly we employed a measure of peer substance use (i.e., Social Risk Index (SRI7), see Table 1) previously found to mediate substance use treatment outcomes among adolescents (Godley, Kahn, Dennis, Godley, & Funk, 2005). As expected, we found no differences between groups on peer substance use, with youth in all three comparison groups having high peer substance use (Chestnut Health Systems, 2012). Interestingly, although the rationale for the Witkiewitz et al. (2011) study was that African American adults with alcohol dependence may have higher peer alcohol use, their study found the exact opposite. That is, African Americans with alcohol dependence had a lower percent of drinkers in their social network compared to Caucasians. Although they controlled for this, it remains possible that drug refusal skills training works best for adults with more manageable social pressures to drink or use drugs versus those individuals whose social networks may be saturated with substance users. We found no evidence that African American adolescents had higher peer substance use, which may explain why there were no differential treatment outcomes for African Americans receiving RST.

Another potential reason for why we failed to replicate Witkiewitz et al.'s (2011) findings is that intervention exposure, as measured by the A-CRA Exposure Scale, was relatively high for two of our three groups. Specifically, for the AA+RST and CA+RST groups, it was above the threshold (AES scores >12) at which Garner et al. (2009) found improved outcomes. Witkiewitz et al.'s (2011) study did not control for overall exposure to treatment, leaving the possibility that overall intervention exposure, rather than RST receipt, drives outcomes. Thus, our study may comprise a stronger test of whether one treatment procedure

versus the entire treatment package is responsible for outcomes. Here we found support for the latter, in that overall AES scores versus RST receipt, predicted adolescent outcomes. One implication from this may be that we should suggest that all youth, regardless of race, should receive as many A-CRA procedures as possible. However, we also note that we replicated findings reported elsewhere (Schmidt et al., 2006) that even with receiving fewer procedures, African American adolescents did not have worse outcomes. That is, the AA-RST group had significantly less exposure to A-CRA procedures, but had similar clinical outcomes at follow up compared to the AA+RST and CA+RST groups, even after controlling for baseline severity. This finding is perplexing, and additional research is needed to explain why identical outcomes are achieved for African Americans at a lower treatment dose.

Finally, it is possible that we didn't replicate Witkiewitz et al.'s (2011) findings due to differences in dosage or quality of RST. We did not have treatment integrity ratings for RST, using a clinician-report binary measure of whether RST was received. Further, in the Witkiewitz et al. (2011) study, some African American participants received multiple sessions of the RST module, which may have impacted outcomes.

4.1.1 Limitations—Although this sample had a large sample size and extensive common measures were available for propensity matching, some limitations bear mentioning. Although we reduced bias for observed variables, it is possible that differences existed on unobserved confounding variables. Further, measures on the quality of the RST provided, therapist effects, and site effects were not available. Some sites may be more effective with diverse youth, or therapist may have been ethnically matched. Additionally, no data in this study could pinpoint different practices that individual counselors may have used to tailor RST. For example, RST involves in vitro role playing of refusal skills, and some clinicians may be more adept at setting up ore genuine role plays that intersect with racial nuances in communication about drug use. Future research may consider coding such interactions. Finally, since clinicians had discretion regarding who received RST this could not be factored into the analysis. The process of how they selected which youth would receive RST is largely unknown.

5.0 Conclusion

Overall dosage of A-CRA, but not exposure to RST predicted outcomes for African Americans. Replication studies and those examining whether racial differences in drug offers exist among adolescents are needed. Based on this study, it seems there is no compelling evidence to support RST as a required component in treatments for African American youth, and A-CRA clinicians may proceed to use RST flexibly with African American clients and focus on delivering a high number of procedures.

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Figure 1.
Substance Frequency Scale (SFS) means at baseline and last follow-up

Figure 2.
Percent of abstinent youth in early remission at baseline and last follow-up

Table 1
Baseline characteristics of the AA+RST, AA-RST, and CA+RST groups prior to and after propensity matching

	Prior to Propensity Score Matching			After Propensity Score Matching		
	<u>AA+RST</u> (n =214) (% (n) or M (SD))	<u>AA-RST</u> (n =335) (% (n) or M (SD))	<u>CA+RST</u> (n = 563) (% (n) or M (SD))	<u>AA+RST</u> (n =214) (% (n) or M (SD))	<u>AA-RST</u> (n =212) (% (n) or M (SD))	<u>CA+RST</u> (n = 214) (% (n) or M (SD))
<i>Demographic Characteristics</i>						
Female	16.4% (35)	20% (67)	29.7% (167) *	16.4% (35)	18.8% (40)	15.9% (34)
Age (in years)	16.30 (1.64)	16.45 (2.18)	16.11 (1.54)	16.30 (1.64)	16.43 (2.12)	16.23 (1.50)
<i>Substance Disorder, Mental Health and CJ Severity</i>						
Days Abstinent (out of 90)	62.2 (31.1)	59.8 (31.9)	60.1 (30.9)	62.2 (31.1)	60.5 (31.7)	61.5 (30.5)
Any Past Year Dependence (PYDep)	31% (67)	30.4% (102)	62.4% (350) *	31% (67)	31% (65)	42% (90) *
Any Past Year Abuse (PYAb)	38% (82)	34.8% (115)	24.1% (135) *	38% (82)	33.5% (70)	35.9% (77)
Treatment Motivation Index (TMI)	1.79 (1.22)	1.96 (1.24)	2.38 (1.31) *	1.78 (1.22)	1.96 (1.25)	1.93 (1.28)
Years of Substance Use (Age minus onset)	3.04 (2.51)	3.23 (2.79)	3.45 (2.28) *	3.04 (2.51)	3.25 (2.78)	3.22 (2.22)
Substance Problem Scale past month (SPSm)	2.03 (2.75)	2.01 (2.75)	2.96 (3.93) **	2.03 (2.75)	1.97 (2.65)	2.38 (3.27)
Substance Frequency Scale (SFS8p)	.11 (.13)	.11 (.12)	.13 (.15) *	.11 (.13)	.11 (.12)	.12 (.14)
Emotional Problems Scale Proportional (EPS7p)	.09 (.29)	.08 (.27)	.17 (.37) *	.09 (.29)	.08 (.27)	.11 (.31)
Conduct Disorder Scale (CDS)	2.93 (3.09)	2.72 (3.05)	3.85 (3.21) *	2.93 (3.09)	2.78 (3.10)	3.06 (3.06)
Anxiety Fear Symptom Scale (AFSS)	1.55 (2.03)	1.80 (2.45)	2.56 (2.64) *	1.55 (2.03)	1.81 (2.51)	1.63 (1.94)
Traumatic Stress Scale (TSS)	1.82 (2.94)	1.85 (3.07)	2.73 (3.69) *	1.82 (2.94)	1.89 (3.14)	1.81 (3.04)
ADHD Scale (ADHDS)	6.33 (5.43)	6.30 (5.73)	8.81 (5.60) *	6.33 (5.43)	6.33 (5.83)	6.93 (5.58)
General Individual Severity Scale (GISS)	27.68 (18.06)	27.45 (20.65)	39.33 (21.41) *	27.68 (18.06)	27.83 (20.57)	30.13 (18.89)
Days in Controlled Environment (maxce)	11.19 (23.79)	11.95 (24.75)	13.58 (26.12)	11.19 (23.79)	12.63 (25.42)	8.67 (21.07)
Crime & Violence Scale (CVS)	6.88 (5.70)	7.00 (5.88)	7.96 (5.76) *	6.88 (5.70)	7.25 (6.02)	7.20 (5.65)
<i>Peer and Social Environment</i>						
Living Environmental Risk Index (LRI7)	10.82 (3.04)	10.93 (3.09)	10.59 (3.15)	10.82 (3.04)	10.96 (3.02)	10.41 (3.11)
Social Environmental Risk Index (SRI7)	13.66 (4.47)	12.96 (4.28)	13.80 (4.55)	13.66 (4.47)	13.45 (4.44)	13.62 (4.47)

	Prior to Propensity Score Matching			After Propensity Score Matching		
	<u>AA+RST</u> (n = 214) (% (n) or M (SD))	<u>AA-RST</u> (n = 335) (% (n) or M (SD))	<u>CA+RST</u> (n = 563) (% (n) or M (SD))	<u>AA+RST</u> (n = 214) (% (n) or M (SD))	<u>AA-RST</u> (n = 212) (% (n) or M (SD))	<u>CA+RST</u> (n = 214) (% (n) or M (SD))
Recovery Environmental Risk Index (mrenr13p)	.24 (.07)	.24 (.08)	.25 (.08)*	.24 (.07)	.24 (.08)	.24 (.07)
<i>Treatment Received prior to Baseline Assessment</i>						
Substance Abuse Tx Index (SATI)	.07 (.26)	.05 (.21)	.12 (.32)*	.07 (.25)	.06 (.24)	.08 (.27)
Mental Health Tx Index (MHTI4)	.09 (.29)	.05 (.23)	.23 (.42)*	.09 (.28)	.06 (.23)	.09 (.29)
Physical Health Tx Index (PHTI5)	.06 (.23)	.06 (.24)	.09 (.29)	.06 (.23)	.06 (.23)	.06 (.24)
IJ/CJ System Index (CISI)	.48 (.50)	.53 (.49)	.38 (.48)*	.48 (.50)	.54 (.49)	.44 (.50)

* p<.05. significant contrasts are only relative to AA+RST group. The full matching variable list is available from the first author