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Trajectory of Substance Use after a Sexual Risk Reduction Intervention

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Abstract

Background—Research assessments can confound the results of treatment outcome studies and can be themselves an intervention or form of aftercare.

Objective—Determine the trajectory of substance use and substance severity in a sample of African-American cocaine users participating in a community-based sexual risk reduction trial.

Methods—Out-of-treatment participants were recruited using Respondent-Driven Sampling in two African-American majority counties in rural Arkansas. They participated in either the sexual risk reduction condition or an active control focused on access to social services. They were interviewed at baseline, post-intervention, and 6 and 12 months post-intervention. Substance use outcome measures were use of crack cocaine, powder cocaine, marijuana, alcohol, and the Addiction Severity Index Alcohol and Drug Severity composites. A random sample of participants completed qualitative interviews post-12-month interview.

Results—251 were enrolled. Substance use outcomes did not differ among the two conditions at any point in the study. Use of measured substances and the ASI composites significantly decreased between baseline and post-intervention ($p < 0.01$), decreases that persisted at the 12-month assessment period compared to baseline. Qualitative findings suggested that many participants identified increased awareness of their drug use and need to control it through the programs. Participants also noted strong bonding with interviewers.

Conclusion—Clinical trials may have positive unexpected outcomes in terms of reduced substance use even though the trial is not substance use focused. Behavioral interventions for drug users that are not focused specifically on reducing drug use may nonetheless have unanticipated positive associations with reductions in drug use.

INTRODUCTION

Remission/reduction of substance use following specialty treatment is generally anticipated (1–6). However, studies have provided convincing evidence that assessments, including follow-up interviews, for clinical trials can themselves be an intervention or form of aftercare. For example, Clifford and Maisto (7) reviewed literature regarding the positive influence of multiple assessments (“reactivity effects”) on alcohol use and likened them to a form of “continuing care.” As a result, they comment that research assessments can confound the results of treatment outcome studies. A more recent report found changes in alcohol use following pre-intervention assessments (8). This finding of reactivity of substance use to assessment is borne out further by natural history studies that identify substance users in “the community” and follow them longitudinally, and which have also found decreases in substance use over time. Unlike treatment studies, which typically enroll users during periods of very high use, natural history studies follow groups of substance users who are not necessarily at an apex of substance use. For example, a study of rural and urban at-risk drinkers who were not necessarily meeting criteria for an alcohol use disorder at baseline found significant decreases in alcohol consumption quantity (but not frequency) as well as prevalence of alcohol use disorders over 18 months’ follow-up in participants who had not received treatment during the study (9, 10). In another study of rural stimulant users, where an inclusion criterion was any stimulant use in the past 30 days, use of cocaine and methamphetamine significantly declined over the three years’ follow-up (11). In a study of emergency room patients with cocaine-associated chest pain, we also found a significant decrease in crack use between baseline and three months, but not between other interviews (12). Other natural history studies (13, 14) have found substantial declines in substance use for sub-groups or on average. A natural history study of young adult club drug users reported not only significant decreases in cocaine, ecstasy, benzodiazepines, and opioids, but also results of focus groups that found the assessments “turned on a light” for respondents (14).

Less commonly reported are changes in a given risky behavior after interventions targeting a different risk behavior. For example, some interventions designed to reduce drug use have also resulted in concomitant changes in sexual risk behavior (15, 16). However, to our knowledge, there has been no report of the reverse effect; that is, there are no reports of changes in substance use following an intervention designed to change sexual risk behavior. In this current report, we present results regarding longitudinal substance use by 251 African American rural cocaine users participating in a controlled sexual risk reduction trial and interviewed longitudinally.

METHODS

Study Overview

African-American cocaine users from two counties in Arkansas were enrolled in a sexual risk reduction trial based on sexual risk reduction portions of Safety Counts (17–19) with an active control condition focused on access to social services. Condition randomization at the county level occurred at the beginning of the study with rolling enrollment of consecutive county cohorts receiving a single condition. Interviews were conducted at baseline, post-

intervention, and 6 and 12 months post-intervention. A random sample of participants was interviewed after the 12-month assessment using a semi-structured interview guide regarding their experiences and thoughts about the study.

Subjects

Participants were from two under-served, predominantly African American, rural counties in the Arkansas Mississippi Delta region with HIV and STI rates that are higher than the rest of the state, high rates of poverty, and lack of educational achievement. Stimulant use, including cocaine and methamphetamine, is prevalent (20). The study focused on African-American cocaine users, given prior work (20) that identified cocaine as a significant concern among African Americans in these counties and high rates of HIV sexual risk (21).

Eligibility criteria were: (a) age 18 or older, (b) self-identified as African American, Black, or mixed race of African American ancestry, (c) cocaine use at least once in the past 30 days, (d) oral, vaginal, or anal sex at least once in the past 30 days, (e) not participating in a drug treatment program at study entry and (f) residing in a study county. Exclusion criteria were: (a) incarceration, or (b) inability to provide contact information. Participants were told the study was about reducing sexual risk among rural cocaine users. The study was approved by the University of Arkansas for Medical Sciences Institutional Review Board.

Sampling and Study Sites

Respondent Driven Sampling (RDS) (22) was used to recruit African American cocaine users from the study counties. Community liaisons and members of the study's Community Advisory Board (CAB) helped to identify five individuals who served as the initial study participants or "seeds" and began the RDS recruitment process. Identified seeds provided informed consent and completed a screening form and, if eligible, were invited to participate. Each participant was given referral coupons to pass on to other individuals and reimbursed for referring up to five eligible individuals to the study (23). Participants were compensated \$15 for time and \$5 for travel for each assessment interview, and \$5 for time and \$5 for travel for each attended intervention session. Participants received \$35 for participating in the qualitative interview, which lasted approximately two hours. Participants also received incentives such as condoms, personal care items (hand lotion, small durable zip-top cases with the study logo, etc., valued at no more than \$2 each), and t-shirts at the completion of each assessment and intervention session. Intervention sessions and most assessments took place at conveniently located offices in each county.

Intervention Conditions

Safety Counts (17–19) is a theory- and evidence-based intervention with proven efficacy among urban drug users and included in the Centers for Disease Control and Prevention's Compendium of Evidence-Based HIV Prevention Interventions (24). It is grounded in Social Cognitive Theory (SCT) (25) and the readiness to change constructs described in the Transtheoretical Model (TTM) (26).

Common Elements—Both conditions followed the basic structure of the Safety Counts intervention. Core sexual risk reduction elements of Safety Counts were retained but session

content was tailored to meet the study aims and the needs of the local cocaine-using population based on previous research in the area (21, 27), input from the CAB and community liaisons (28), and focus groups conducted with members of the study population (29). Both conditions included two 2-hour group sessions, two 60-minute individual sessions, two 2-to-3-hour community events, and two 40-minute follow-up individual sessions, occurring over four months.

A health educator conducted all individual sessions; group sessions and community events were co-led by the health educator and a peer leader (African American residents of study counties who had histories of cocaine use and reported abstinence from use for at least one year). Both conditions focused on enhancing healthy behaviors relevant to that condition using theory-based methods including goal setting, skills-building, and problem-solving. Both the intervention and control conditions discussed drug use as a contextual/complicating factor in sexual risk and getting access to social services, but goal-setting in each condition was focused on behaviors around sexual risk and social service access, respectively. All event activities were condition-specific to avoid contamination. All assessment and intervention staff were blind to study hypotheses and treatment outcomes.

The Sexual Risk Reduction Condition—The content of this condition was adapted from Safety Counts and emphasized multiple aspects of sexual risk reduction. We adapted the intervention to focus specifically on sexual risk. Needle sharing was not addressed, but the context of drug use and how drug use might affect sexual risk behavior was addressed. The emphasis in goal-setting sessions of the intervention was on choosing a sexual risk reduction goal. Group session 1 helped participants identify their personal risk for acquiring STIs or HIV, practice condom use skills, and identify their stage of readiness to change for specific sexual risk behaviors. Group session 2 focused on helping participants choose a personally-relevant and measurable goal for reducing their sexual risk, identify first steps to take towards their goal, identify barriers to the goal, brainstorm possible solutions to the barriers, and identify sources of social support and reinforcement. Although participants were permitted to choose a goal that was related to drug use, they were required to choose a goal that emphasized sexual risk reduction as the primary outcome. Community events were designed to strengthen participation in the program, provide opportunities for reinforcement of program norms and messages, and provide social support for risk reduction efforts. Follow-up individual sessions provided opportunities for goal review and reinforcement for progress toward goal attainment, identification of new barriers along with strategies for overcoming those barriers, and identification of next steps for achieving or maintaining goals. Free condoms were available at all sessions.

The Social Services Access Condition—The control condition was an active, culturally-relevant intervention, which included SCT-based strategies that have been demonstrated to influence behavior change. This condition was designed to be identical to the sexual risk reduction condition in structure and time, so that participants received an equivalent amount of contact with concerned professionals and with other African American cocaine users. The content focused on increasing access to and use of social and community services such as educational or legal support, medical or dental care, or financial and

employment assistance. As with the sexual risk reduction condition, participants were permitted to choose a goal that was related to drug use. For this condition only, participants could set as a goal “getting into drug treatment.”

Data Collection

Participants were assessed at baseline, within four-weeks’ post-intervention, and 6 and 12-months after the intervention was completed. Post-intervention and follow-up assessments were the same as the baseline assessment. The first baseline assessment was conducted on February 4, 2009, and the last post-intervention assessment occurred on August 5, 2011. Interviewers used Computer-Assisted Personal Interviewing (CAPI) technology to conduct the assessment; which took approximately 2.5 hours to complete with a 15-minute break. All interviewers were local residents of the study counties, and were self-identified as in recovery from cocaine abuse or dependence (28). After all 12-month follow-up assessments had been completed, semi-structured qualitative interviews with 36 randomly selected participants were conducted by study investigators using an interview guide. The interviews focused on participants’ perceptions of the intervention process and content, as well as participants’ opinions on how the intervention could be improved or how it would need to change if it were to be implemented in other community settings, such as drug treatment programs or faith-based organizations.

Measures

Most of the assessments were focused on measures related to the study’s sexual risk-related focus that are not further discussed in this report. Demographic and self-reported sexual risk behavior data were collected using items from the Risk Behavior Assessment (30), including demographic data, and self-reported sexual risk behaviors. Also included were the alcohol and drug use composites from the Addiction Severity Index (ASI) (31) including past-30-day use of alcohol and a range of individual drugs.

Data Analysis

Initially, bivariate analyses were performed to evaluate potential differences in key demographic characteristics at baseline across the two intervention groups using chi-square test statistic or Fisher’s exact test. Next, unadjusted generalized estimating equation (GEE) models were used to model longitudinal count outcomes based on the number of days’ use of crack, powdered cocaine, marijuana, and alcohol in the past 30 days with either a Poisson or negative binomial distribution. GEE models with a binomial distribution were used to analyze longitudinal dichotomized outcome variables based on any use in the past 30 days of crack, powdered cocaine, marijuana, and alcohol. For the ASI alcohol and drug composites, we used repeated measures analysis of variance (ANOVA) models. For each of the unadjusted analyses, the models included three fixed effect terms, namely, condition, time, and condition-by-time interaction. Finally, multivariate GEE models and repeated measures ANOVA were used to assess longitudinal substance use over a one-year period while adjusting for participants’ age, gender, marital status, education, and employment.

A general inductive approach was used for analyzing qualitative data. The data were first read without coding for overall understanding of the transcribed text interviews. Constant

comparison and content analysis techniques (32) were then used to identify, code, classify, and label primary patterns in the data (33). A codebook with definitions was developed by the research team based on the first three interviews that was subsequently used in coding all interviews. Significant statements and pertinent phrases were extracted, and statements organized into clusters using Ethnograph V6 software.

Results

Description of Sample

Two hundred and fifty-one African-American cocaine users were enrolled; Table 1 summarizes baseline demographics. Across conditions, approximately half of the participants were female, a majority were unemployed, had an average age of 38 years, annual income of less than \$5,000, and at least a high school education. In general, there were no significant differences in the baseline demographics or baseline or longitudinal substance use and substance use severity between intervention conditions. However, the social services group had a higher percentage of individuals who were married or living as married ($p=0.027$).

Attendance at intervention sessions was varied. On average, participants in the social services intervention attended 5.0 sessions (median=6, range 0–8) and participants in the risky behavior intervention attended 4.1 sessions (median=4, range 0–4). Attendance at particular sessions was consistently lower for the risky behavior group compared to the social services group and 14 vs 9 respectively attended no sessions.

Interview follow-up rates were: 81.7% (205/251) for the post-intervention interview, 76.5% (192/251) for the six-month interview, and 70.9% (178/251) for the 12-month interview. At each interview, we did not find significant differences between intervention conditions in number of days' use of crack, powder cocaine, marijuana, or alcohol during the past 30 days or the condition by time interaction. The results of these analyses are described in the Appendices (Appendix 1 and 2a, b). Therefore, all subsequent analyses were conducted using pooled data across conditions.

The results of the unadjusted longitudinal substance models are presented in Table 2. There was a significant decrease in all four substances' usage between baseline and post-intervention ($p < 0.01$). In addition, the decrease in crack, powder, and alcohol usage persisted at the 12-month assessment period when compared to baseline. These results were also true for both the ASI drug and alcohol composite scores. However, no significant differences were observed between other pairs of interviews apart from baseline.

The results based on a GEE model with binomial distribution for the dichotomized substance use (yes/no) in the past 30 days for crack, powder, marijuana, and alcohol are also provided in Table 2. The results are presented as estimated proportion of drug specific usage along with their respective 95% confidence intervals. Except for alcohol, the proportion of individuals using crack, powder cocaine, or marijuana decreased significantly at post-intervention ($p<0.01$).

Table 3 gives the results from the multivariable analysis models. Again given that the condition-by-time interaction and condition effects were not statistically significant, the data were pooled across intervention groups and the analyses centered on the trajectory of substance use while adjusting for key demographic characteristics (age, gender, marital status, education, and employment). The multivariable GEE results for crack, marijuana, and alcohol usage were similar to their corresponding unadjusted GEE models. More specifically, each model indicated a significant reduction in these particular substances at post-intervention. Furthermore, the drop in usage persisted at 12 months follow-up for crack and alcohol usage. This trend was also observed in both adjusted repeated measures ANOVA models for ASI alcohol and drug composites. However for powder cocaine, the adjusted GEE model with a negative binomial distribution indicated a non-significant reduction in average powder usage between baseline assessment and post-intervention.

The results based on an adjusted GEE model with binomial distribution for the dichotomized substance use in the past 30 days for crack, powder, marijuana, and alcohol are also provided in Table 3. Again, the data suggest a statistical significant reduction in the proportion of participants using a particular drug at post-intervention compared to baseline. Furthermore, this phenomenon continued for crack, powder, and marijuana for the duration of the study period.

Four themes emerged from the qualitative data analysis. These themes, with the frequency stated for each theme, were: life review (n=541), insight (n=214), behavior change (reduction in sex risk behaviors and drug use and taking action; n=446), and interactions with study staff (n=380). A common thread in all of the interviews was how participation in the assessment interviews and/or intervention as well as interaction with staff or peers led to a life review. Furthermore, participants gained "insight" or awareness of their lives by participating in the study, a theme that emerged from all interviews. These themes were voiced whether participants only attended one session or all sessions or no intervention session. Participants did not distinguish between health educators and interviewers or between the interviews and the intervention. Answering the interview questions and/or attending one-on-one or group sessions "it helped me think" and "review my life." Some thought the purpose of the study was to get them off drugs but all thought it was to help them.

Life review was a central phenomenon of interest identified in all qualitative interviews. Participants discussed how going through the assessment interview and/or intervention gave them insight concerning their current life situation and lifestyle consequences. Although most said they continued to use drugs, they talked about how they had reduced their drug use in response to the insight and awareness they gained from the program and their interaction with study staff. Below are a few representative quotes illustrating self-reported reduction in drug use:

Like I said, the conversation and times I spent with (name of staff). I guess 'cause she listened to me. You know, I could tell she was always concerned. It helped me to strengthen my life together. You know, I was doing two or three different kind of

drugs. And now I'm doing just like one drug. It helped me motivate me to not want to go back into the same life that I had been living.

Another participant said,

It [the study staff] helped me stop smoking crack, and I thank them every day. I might see them or call them up. I've got to call them and let them know how good I'm doing. I mean it really helps me, they really do. I mean they would sit down and listen to you about your problems.

Another spoke of reducing overall drug use, "But I get high maybe three times out of a month. That's a big cutback!" Yet another spoke of how participating in the study had impacted his drug use,

And the time I like first got here, I was still out on drugs. You know and I have learned now that you can't just up and quit but you can cut back a whole lot and with this program I have cut back a whole lot.

Participants also talked about the difference between not caring about anything when they were high on drugs and gaining insight about themselves and their lives and having the ability to make changes that would improve their lives. Reduction in drug use was attributed to the impact of being interviewed and personal qualities of the interviewers, as discussed by this 36 year old man:

And you know I mean it makes me feel good that I can sit here and discuss my past problems and my past, you know, addictions and stuff. And how from that point I was and to this point I'm getting better. And I'm telling you, that's what made—that's what really, really made the difference in my life because I have told them stuff that I have never told my wife or my sisters.... I don't never talk to nobody. Like I said, I usually keep things bundled up. But I have talked to them, I have opened up to them, and that's not me. Because they sweet. They're sweet people, and they understand you. They show careness. They show that they care about you, and they care about how you're feeling right now.... Whether it was their job or not, it was just a feeling that they gave you when you walked out of that door. Yes, you can't fake that. You sure can't fake that.

Discussion

Overall, participants experienced a significant reduction in their substance use and substance use severity composites from the baseline interview to the post-intervention interview, with no significant differences among the two interventions. This decrease was still observed after adjusting for demographic characteristics and time in multivariate models and generally persisted through the 12-month interview. On average, the reductions on days of cocaine use were modest (about 2–3 days), but the decrease in any past 30 days' use for crack and powder cocaine between baseline and post-intervention (from 63% to 50% for crack, and from 46% to 25% powder) suggests that a number of participants were able to make a substantial change in their drug use.

Potential explanations are an interview effect (though they only had one assessment interview before the significant reduction occurred), attention effects, social support from interviewers (noting that social support is a major construct in Social Cognitive Theory), or the interventions themselves. While we note that both interventions made reference to drug use as the context of risky behavior or non-use of social services, they were strongly focused on their respective topics and spent the majority of their time on these topics. The qualitative interviews also suggest that study participation allowed them the opportunity to gain insight into their lives and, on average, to make some changes in their drug use.

These results suggest that behavioral interventions for drug users that are not focused specifically on reducing drug use may nonetheless have unanticipated positive associations with reduced drug use. In this study, there were no requirements that individuals enter drug treatment or otherwise reduce their drug use as a condition of enrollment. However, as noted above, participants could decide to work on their drug use if it was related to the specific condition's focus. Given that both intervention conditions did discuss (but did not focus on) the negative impact of using cocaine and other drugs on sexual risk and access to social services and overall well-being, it may be that many participants experienced motivation to reduce their use as a result of the increased awareness of their drug use that occurred during the program. The quotes from participant qualitative interviews confirm that study participation led to a life review process that took many participants along the path of reduced drug use.

In the qualitative interviews, participants appeared to have related as much to the quantitative interviewers as to the health educators assigned to their specific intervention condition. Indeed, reductions in drug use in reaction to assessments alone have been noted repeatedly in the substance use literature (14). All staff, interviewers and interventionists were local study residents, and interviewers were also self-identified as individuals who were recovering from stimulant abuse or dependence. All staff were selected for their demonstrated ability to work effectively with the target population and trained in assessment or intervention skills as appropriate. In addition, some staff routinely demonstrated many interpersonal behaviors and characteristics that have been noted in the psychotherapy literature to be important to the development of a "positive therapeutic alliance," including reflective listening, respectful and positive regard, and paying attention to the participant's experience (34). Such characteristics are associated with positive treatment outcomes in many vulnerable populations, including substance users (35–37), and may have had a similarly positive effect in this experimental setting as well.

The syndemic nature of drug use and the issues that were the focus of the intervention and control conditions, sexual risk and needs for social services, may also account for some of the observed effects. A syndemic model of health outcomes describes multiple health and social issues that interact and influence each other to create disparities in vulnerable populations (38). Syndemic models have been used to explore the co-occurrence of poverty and poor access to social services or supports, substance use, mental health concerns, and sexual risk in multiple high risk populations (39–41). Syndemic models suggest that intervening in one area of the syndemic may have beneficial affects across the other areas; thus, by supporting healthier sexual decision-making or access to social services, the

activities of the intervention and control conditions in our study may have had such syndemic effects on drug use. Future work needs to examine the specific relationships between drug use and sexual risk over time.

There are several limitations to these data, specifically the very specific nature of our study population (African-American cocaine users in two rural Arkansas Delta counties), but these findings have parallels to other community-based studies (9, 12). Additionally, the results could be attributed to social desirability effects in follow-up interviews, if participants perceived an expectation on the part of interviewers or other study staff to report lowered drug use. However, the high rates of other risk behaviors reported by the participants (42) suggest that “faking good” was not common in the interview assessments.

Overall, these data suggest that substance use frequency and intensity may be important to track in any intervention designed to include substance users, whether or not substance use is the target of the intervention itself, and that it is important to examine the reactivity of substance use both to assessment and intervention activities in both research and community contexts.

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Appendix

Appendix 1

Sample description at baseline for various drug usage

Variables (days use past 30 days)	Total Mean $\pm$ SD	Social Services Mean $\pm$ SD	Risky Behavior Mean $\pm$ SD	p-value
Crack	8.93 $\pm$ 10.68	8.88 $\pm$ 10.27	8.99 $\pm$ 11.21	0.280
Powder	3.83 $\pm$ 7.11	3.79 $\pm$ 6.95	3.88 $\pm$ 7.34	0.919
Marijuana	12.58 $\pm$ 12.47	11.67 $\pm$ 12.30	13.71 $\pm$ 12.65	0.087
Alcohol	15.34 $\pm$ 11.82	14.81 $\pm$ 11.98	16.00 $\pm$ 11.63	0.064
ASI Alcohol composite	0.23 $\pm$ 0.20	0.22 $\pm$ 0.20	0.24 $\pm$ 0.20	0.287
ASI Drug composite	0.17 $\pm$ 0.10	0.17 $\pm$ 0.12	0.17 $\pm$ 0.09	0.098

Note: all p-values based on two-sample Wilcoxon rank-sum test

Appendix 2

a: GEE results for a three fixed effect model for days use past 30 days (crack, powder, marijuana, and alcohol).								
	Crack		Powder		Marijuana		Alcohol	
Variables	χ^2	p-value	χ^2	p-value	χ^2	p-value	χ^2	p-value
Intervention	0.64	0.425	0.24	0.622	1.67	0.197	1.23	0.267
Time	23.58	<0.0001	23.92	< 0.001	11.90	0.008	15.80	0.0012
Intervention $\times$ Time	2.22	0.528	5.84	0.120	4.18	0.243	5.39	0.146

b: Repeated measures ANOVA results for a three fixed effect model for days use past 30 days (ASI alcohol composite & ASI drug composite).				
	ASI alcohol		ASI drug	
Variables	F-value	p-value	F-value	p-value
Intervention	0.01	0.931	0.31	0.576
Time	5.72	0.0008	14.65	< 0.0001
Intervention $\times$ Time	1.14	0.333	0.67	0.569

Table 1

Sample Description at Baseline

Variables	Social Services (N = 139)	Risky Behavior (N = 112)	Total
Demographics			
Age (mean $\pm$ SD)	38.5 $\pm$ 12.5	37.3 $\pm$ 13.0	38.0 $\pm$ 12.7
Female, N (%)	67 (48%)	55 (49%)	122 (49%)
Married, N (%) ^a	31 (22%)	13 (12%)	44 (18%)
High school graduate, N (%)	71 (51%)	54 (48%)	125 (50%)
Employed, N (%)	29 (21%)	28 (25%)	57 (23%)
Annual Income, N (%) ^b			
< \$5,000	92 (71%)	76 (76%)	168 (73%)
\$5,000 to \$9,999	26 (20%)	15 (15%)	41 (18%)
\$10,000	12 (9%)	9 (9%)	21 (9%)

^a denote a significant chi-square test statistic with $p < 0.05$;

^b denote variable contain missing observations.

Table 2

One-year Unadjusted Longitudinal Substance Use^{*}

Interview Least Square Means [95% CI]						
Outcome Variable	Baseline	Post-intervention	6 Months Post-Intervention	12 Months Post-Intervention	Effect of Time	
Days use past 30 days						
Crack (days)	8.39 [7.70, 10.35]	6.35 [5.14, 7.85] ^a	6.19 [4.98, 7.68] ^a	6.50 [5.22, 8.10] ^a	p<0.0001	
Powder (days)	3.83 [3.05,4.82]	1.79 [1.25, 2.58] ^a	1.86 [1.29, 2.67] ^a	2.23 [1.59, 3.17] ^a	p<0.0001	
Marijuana (days)	12.56 [11.11, 14.20]	10.08 [8.57, 11.84] ^a	10.64 [9.10, 12.45] ^b	11.03 [9.47,12.85]	p=0.0059	
Alcohol	15.34 [13.95, 16.87]	12.76 [11.31, 14.39] ^a	13.52 [12.05,15.18] ^a	12.63[11.15, 14.32] ^a	p=0.0013	
ASI Alcohol composite	0.23 [0.21, 0.26]	0.19 [0.17, 0.21] ^a	0.20 [0.18, 0.22] ^b	0.19 [0.16, 0.21] ^a	p=0.0015	
ASI Drug Composite	0.17 [0.16, 0.18]	0.13 [0.11, 0.14] ^a	0.13 [0.12, 0.14] ^a	0.14 [0.12, 0.15] ^a	p<0.0001	
Interview Estimated Proportions [95% CI]						
Binary Outcome Variable	Baseline	Post-intervention	6 Months Post-Intervention	12 Months Post-Intervention	Effect of Time	
Any Use past 30 days						
Crack	0.63 [0.57, 0.69]	0.50 [0.43, 0.56] ^a	0.49 [0.42, 0.55] ^a	0.49 [0.42, 0.55] ^a	p<0.0001	
Powder cocaine	0.46 [0.40, 0.52]	0.24 [0.19, 0.30] ^a	0.24 [0.18, 0.30] ^a	0.25 [0.20, 0.32] ^a	p<0.0001	
Marijuana	0.76 [0.70, 0.81]	0.62 [0.56, 0.69] ^a	0.66 [0.59, 0.72] ^a	0.66 [0.59, 0.72] ^a	p=0.0003	
Alcohol	0.89 [0.85, 0.93]	0.84 [0.78, 0.88]	0.87 [0.82, 0.91]	0.89 [0.83, 0.92]	p=0.0747	

^{*} Days of use were modeled by GEE Negative Binomial regression or GEE Poisson regression model; ASI composites were analyzed with repeated measures ANOVA; "any use" analyzed with binomial GEE models;

^a Denote statistically significant pairwise comparison to Baseline (p<0.01);

^b Denote p<0.05.

Table 3**One-Year Adjusted Longitudinal Substance Use ***

Interview Least Square Means (95% CI)						
Outcome Variable	Baseline	Post-intervention	6 Months Post-Intervention	12 Months Post-Intervention	Effect of Time	
Days use past 30 days						
Crack (days)	7.54 [6.05, 9.39]	4.54 [3.49, 5.91] ^a	4.31 [3.17, 5.85] ^a	4.07 [3.04, 5.43] ^a	p<0.0001	
Powder (days)	1.82 [1.29, 2.55]	1.22 [0.68, 2.21]	1.02 [0.61, 1.70] ^b	1.36 [0.84, 2.20]	p=0.0383	
Marijuana (days)	10.38 [8.81, 12.24]	8.32 [6.88, 10.06] ^a	9.15 [7.63, 10.97]	9.63 [8.12, 11.44]	p=0.0069	
Alcohol	16.02 [14.41, 17.80]	12.90 [11.45, 14.54] ^a	13.79 [12.13, 15.69] ^a	12.59 [11.11, 14.27] ^a	p<0.0001	
ASI Alcohol composite	0.24 [0.21, 0.26]	0.19 [0.16, 0.22] ^a	0.20 [0.18, 0.23] ^a	0.18 [0.16, 0.21] ^a	p=0.0002	
ASI Drug Composite	0.17 [0.15, 0.18]	0.12 [0.11, 0.14] ^a	0.13 [0.11, 0.14] ^a	0.13 [0.12, 0.15] ^a	p<0.0001	
Interview Estimated Proportions [95% CI]						
Binary Outcome Variable	Baseline	Post-intervention	6 Months Post-Intervention	12 Months Post-Intervention	Effect of Time	
Any Use past 30 days						
Crack	0.79 [0.72, 0.85]	0.56 [0.46, 0.65] ^a	0.52 [0.43, 0.61] ^a	0.50 [0.40, 0.59] ^a	p<0.0001	
Powder cocaine	0.38 [0.30, 0.46]	0.15 [0.10, 0.22] ^a	0.14 [0.10, 0.21] ^a	0.18 [0.12, 0.26] ^a	p<0.0001	
Marijuana	0.75 [0.68, 0.80]	0.61 [0.53, 0.68] ^a	0.65 [0.57, 0.73] ^a	0.66 [0.58, 0.73] ^b	p=0.0014	
Alcohol	0.90 [0.86, 0.94]	0.84 [0.78, 0.89] ^a	0.88 [0.82, 0.92]	0.89 [0.84, 0.93]	p=0.0461	

* Adjusted for gender, education, marital status, and employment. Days of use were modeled by GEE Negative Binomial regression or GEE Poisson regression model; ASI composites were analyzed with repeated measures ANOVA; "any use" analyzed with binomial GEE models;

^a Denote statistically significant pairwise comparison to Baseline (p<0.01);

^b Denote p<0.05.