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# Applying behavioral activation to sustain and enhance the effects of contingency management for reducing stimulant use among individuals with HIV infection

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## Abstract

There is a high prevalence of stimulant use among HIV-infected individuals, which is associated with suboptimal antiretroviral therapy (ART) adherence, HIV treatment interruptions, detectable HIV viral load, and transmission of HIV via increased sexual risk behavior. Contingency management (CM) is an initially effective treatment for stimulant use. However, the effects of CM are not sustained after the active intervention has ended. One potential contributor to the intractability of existing treatments may be a lack of attention to replacement activities or the role of depressed mood. Behavioral activation (BA) is an evidence-based approach for depression that involves identifying and participating in pleasurable, goal-directed activities. As a potential approach to address the CM rebound effect - informed by our formative qualitative research with the participant population - we conducted an open pilot trial of an intervention combining CM-BA for HIV-infected individuals with stimulant use disorder. Participants completed weekly BA therapy sessions (10–16 sessions) and thrice-weekly toxicology screenings (12 weeks);

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Disclosure statement

No potential conflict of interest was reported by the authors.

Compliance with ethical standards

Ethical approval

All procedures performed involving human participants were in accordance with the ethical standards of the institutional Review Board of The Fenway Institute (Boston, MA) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors.

Informed consent

Informed consent was obtained from all individual participants included in the study.

contingencies were rewarded for negative toxicology tests to support reengagement into positive life activities. Major assessments were conducted at baseline, 3-, and 6-months. Toxicology screening was repeated prior to the 6-month assessment. Eleven participants with stimulant use disorder enrolled; 7 initiated treatment and completed the full intervention. The mean age was 46 (SD = 5.03) and 14% identified as a racial/ethnic minority. Of the completers, the mean change score in self-reported stimulant use within the past 30 days (within-person change; reduction in self-reported stimulant use) was 4.14 days at 3 months and 5.0 days at 6 months [Cohen's d = 0.89]. The mean change score in weekly toxicology screens (reduction in positive toxicology screens) was .71 at 3 months and 1 at 6 months [Cohen's $d$ = 1.05]. Exit interviews indicated that the integrated intervention was well received and acceptable. This study provides preliminary evidence that a combined CM-BA intervention for this population was feasible (100% retention at 6-months), acceptable (100% of intervention sessions attended; participants rated the intervention 'acceptable' or 'very acceptable'), and may be an option to augment the potency and sustained impact of CM for this population. Future pilot testing using a randomized controlled design is warranted.

### Keywords

Stimulants; contingency management; behavioral activation; HIV; ART

## Introduction

Stimulant use is a risk factor for HIV acquisition and transmission (Klinkenberg & Sacks, 2004; Mimiaga et al., 2015; Rajasingham et al., 2012). While survival rates for HIV have significantly improved over the last two decades, rates of disease progression are higher for individuals that use stimulants compared to those who do not (CDC, 2010). Stimulant use among HIV infected individuals leads to decreased utilization of medical care for HIV (Bell et al., 2010; Blashill et al., 2014; Cunningham, Sohler, Berg, Shapiro, & Heller, 2006), reduced initiation of antiretroviral therapy (ART), poor adherence to ART (Marquez, Mitchell, Hare, John, & Klausner, 2009; Meade, Conn, Skalski, & Safren, 2011), increased risk of malnourishment (Vogenthaler et al., 2010), and accelerated disease progression independent of ART adherence (Baum et al., 2009; Carrico et al., 2007; Cook et al., 2008; Rafie et al., 2011). Further, HIV-infected individuals that use stimulants may engage in sexual behaviors that place their partners at risk for HIV (Carrico, 2011; Harzke, Williams, & Bowen, 2009; Metsch et al., 2008; Mimiaga et al., 2008, 2013, 2012).

Available pharmacologic and behavioral treatment options for stimulant use disorder are limited (Karila et al., 2011; Karila et al., 2010; Lee & Rawson, 2008). Contingency management (CM), based on the principles of operant conditioning, is a behavioral treatment that uses escalating monetary vouchers or prizes to reward positive behaviors (e.g. urine negative for stimulant metabolites), and has been used for the treatment of stimulant use disorder (Epstein, Hawkins, Covi, Umbricht, & Preston, 2003; Petry, Alessi, Marx, Austin, & Tardif, 2005; Silverman, Robles, Mudric, Bigelow, & Stitzer, 2004), but the initial reductions in use are not sustained once the contingencies are removed (Vocci & Montoya, 2009). In our group's formative work (Mimiaga et al., 2008, 2012) we found that chronic

stimulant use precipitates anhedonia, the symptom of major depression in which individuals no longer enjoy previously enjoyed activities; the lack of engagement brings about more depression-like symptoms (Leventhal et al., 2010). Behavioral activation (BA), is an evidenced-based approach in the treatment of depressed mood and prevention of depressive relapse, which focuses on helping the client to reengage in positive life activities that are generally avoided while in a depressed state. Thus, BA may be well-suited to complement CM, as the vouchers from CM can be used to increase motivation for, and support reengagement into, positive life activities. We conducted an open pilot study of a combined BA/CM intervention to treat stimulant dependence and sustain abstinence among a sample of HIV infected individuals.

## Methods

### Participants and procedures

Men and women were recruited from primary care clinics and AIDS service organizations in the greater Boston area. Participants were eligible to enroll if they were 18 years or older, HIV-infected (confirmed), met DSM-IV diagnostic criteria for stimulant abuse or dependence, and had evidence of active stimulant use in the past 3-months (confirmed by saliva toxicology test, medical provider report, or documented recent stay in an inpatient detoxification center). Participants completed a written informed consent process before any study activities commenced; this protocol was approved by the Institutional Review Boards at Beth Israel Deaconess Medical Center and Harvard Medical School.

### Assessments visits

Self-administered and clinician-administered assessments were conducted at baseline, 3-, and 6-months.

In the 4-weeks preceding the 6-month assessment visit, saliva samples were tested twice weekly using the iScreen OFD™. Participants that initiated treatment were asked to complete a brief exit survey to assess participant acceptability of the intervention.

### Combined behavioral activation and contingency management intervention

The CM intervention was based on protocols previously described in the literature (Menza et al., 2010; Roll & Shoptaw, 2006; Shoptaw et al., 2006). Saliva samples were tested 3 times a week for 12 consecutive weeks after baseline.

CM study visits were scheduled Monday through Friday, with flexible hours. Participants received escalating monetary vouchers for every stimulant-free sample. Vouchers started at $2.50 for the first stimulant-free sample and increased by $1.25 for every consecutive stimulant-free sample thereafter up to a maximum of $10.00. Vouchers could be redeemed for goods or services at any time during the intervention or active follow-up.

Participants received between 10 to 16 sessions of a manualized BA intervention for stimulant use over a 10 to 16-week period. The number of BA sessions varied according to the participant’s needs and severity of use and was delivered by a masters-level clinician supervised by a licensed clinical psychologist. The intervention focused on guiding

participants to reengage in life activities by actively pursuing events likely to elicit feelings of mastery or pleasure. Participants were encouraged to use monetary vouchers earned from successful CM visits (i.e. negative stimulant metabolites in saliva toxicology test) in a way that supported the goals of BA (e.g. gym memberships, theatre tickets, home improvement products, etc.).

### Measures

We collected standard sociodemographic characteristics of the sample.

All participants met DSM IV criteria for stimulant abuse or dependence, determined by the MINI (Sheehan et al., 1997). We also administered the NIDA-CTN ASI-Lite (McLellan, Luborsky, Woody, & O'Brien, 1980). Participants were asked the number of days they used stimulants in the past 30 days. Other substances used in the past 3 months were also assessed.

Prior to each CM study visit, participants were asked to complete a weekly assessment of the number of days they used stimulants over the past seven days.

In addition, we administered the following psychosocial assessments: 1) the Behavioral Activation Scale (Kanter, Mulick, & Martell, 2004; Martell, 2003, p. 2) the Montgomery-Asberg Depression Rating Scale; and 3) the 20-item Center for Epidemiologic Studies - Depression Scale, (Radloff, 1977).

Finally, participants were asked to rate their ART adherence in the past month using a visual analog scale, ranging from 0 (none) to 100 (all) (Simoni et al., 2006; Walsh, Mandalia, & Gazzard, 2002).

### Data analyses

Study data were collected and managed using REDCap, an electronic data capture tool (Harris et al., 2009). Data were analyzed using SPSS software(v.18). Means for continuous variables and frequencies for categorical variables were calculated to describe the participants at baseline. Feasibility of the intervention was assessed by examining attrition for the survey assessment visits. Additionally, attendance at the therapy sessions were examined. Estimated differences in outcomes pre- to post-treatment: within-person mean change was calculated using paired t-tests. Effect size estimates (Cohen's *d*) were calculated by taking the difference between the means divided by the pooled standard deviation.

## Results

Between January 2011 and January 2012, 11 participants enrolled and seven initiated and completed the combined CM/BA intervention. Participants' mean age was 46 years (SD = 5.03). Twenty-seven percent (n = 3) identified as African American/Black, 73% (n = 8) as White, and 8% (n = 1) were Hispanic/Latino.

Among those who initiated treatment, 100% (n = 7) were retained at the 6-month follow-up visit. Notably, study attendance for the BA/CM components of the intervention was high.

All but one attended at least two of the 3 weekly CM visits, and all participants completed 10 or more BA sessions.

Of those who completed the intervention, the mean change score in self-reported stimulant use within the past 30 days (within-person change) was 4.14 (−4.14) at 3 months and 5.0 (−5.0) at 6 months [Cohen's $d = 0.89$]. The mean change score in weekly toxicology test results for stimulants (i.e. a decrease in positive toxicology screens) was 0.71 (−0.71) at 3 months and 1 (−1) at 6 months [Cohen's $d = 1.05$]. Proposed mediators were in the hypothesized direction. At the 3-month assessment, the mean within-person change in behavioral activation was 13.00, and was 16.29 at the 6 month visit [Cohen's $d = 0.22$]. The mean within-person change for depressive symptoms was 3.14 (−3.14) 3 months post-baseline, and 8.57 (−8.57) 6 months post-baseline [Cohen's $d = 0.61$].

All participants reported being prescribed ART. The mean change score for missed doses of ART within the last 7 days was 4.75 (−4.75) at 3 months, and 14.20 (−14.20) at 6 months [Cohen's $d = .63$].

All participants rated the intervention as 'acceptable' or 'very acceptable.'

## Discussion

This is the first study of which we are aware to examine the ability of BA to sustain the initial effects (reduced stimulant use) achieved via CM in HIV-infected adults. This pilot of the intervention shows that it is acceptable to study participants, feasible to deliver, and may result in sustained reductions in stimulant use. In addition, participants had reduced depressive symptoms (by self-report and clinician observation), improved ART adherence, and felt more confident about engaging consistently in HIV care at each follow-up visit.

As with all pilot studies, limitations exist, and are important to acknowledge. First, the sample size was small and we did not use a randomized-controlled design; because of this we were not sufficiently powered to assess efficacy. Lastly, study participants were already engaged in HIV care and prescribed ART at baseline; hence, our findings may not be generalizable to HIV-infected individuals who are not engaged or retained in HIV care and not prescribed ART.

The results of this open pilot trial show that a combined CM-BA intervention is feasible to implement, acceptable to the participant population, and may decrease several barriers to successful HIV care, including stimulant use, depression, and suboptimal ART adherence. Following a Stage Model for psychosocial treatment development (Rounsaville et al., 2001), future pilot testing using a randomized controlled design is warranted.

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## References

Baum MK, Rafie C, Lai S, Sales S, Page B, & Campa A (2009). Crack-cocaine use accelerates HIV disease progression in a cohort of HIV-positive drug users. Journal of Acquired Immune Deficiency Syndromes, 50(1), 93–99. [PubMed: 19295339]

Bell C, Metsch L, Vogenthaler N, Cardenas G, Rodriguez A, Locascio V, & del Rio C (2010). Never in care: Characteristics of HIV infected crack cocaine users in 2 US cities who have never been to outpatient HIV care. Journal of Acquired Immune Deficiency Syndromes, 54(4), 376–380. [PubMed: 20173648]

Blashill AJ, Bedoya CA, Mayer KH, O'Cleirigh C, Pinkston MM, Remmert JE, . . . Safren SA (2014). Psychosocial syndemics are additively associated with worse ART adherence in HIV-infected individuals. AIDS and Behavior, 19(6), 981–986.

Carrico AW (2011). Substance use and HIV disease progression in the HAART era: Implications for the primary prevention of HIV. Life Sciences, 88(21–22), 940–947. [PubMed: 20934437]

Carrico AW, Johnson MO, Moskowitz JT, Neilands TB, Morin SF, Charlebois ED, . . . Chesney MA (2007). Affect regulation, stimulant use, and viral load among HIV-positive persons on anti-retroviral therapy. Psychosomatic Medicine, 69(8), 785–792. [PubMed: 17942835]

Centers for Disease Control and Prevention. (2010). HIV surveillance report: Diagnoses of HIV infection and AIDS in the United States and Dependent Areas, 2009. Retrieved from http://www.cdc.gov/hiv/pdf/statistics_2009_HIV_Surveillance_Report_vol_21.pdf

Cook JA, Burke-Miller JK, Cohen MH, Cook RL, Vlahov D, Wilson TE, & Grey DD (2008). Crack cocaine, disease progression, and mortality in a multicenter cohort of HIV-1 positive women. AIDS, 22(11), 1355–1363. [PubMed: 18580615]

Cunningham CO, Sohler NL, Berg KM, Shapiro S, & Heller D (2006). Type of substance use and access to HIV-related health care. Aids Patient Care and STDS, 20(6), 399–407. [PubMed: 16789853]

Epstein D, Hawkins W, Covi L, Umbricht A, & Preston K (2003). Cognitive-behavioral therapy plus contingency management for cocaine use: Findings during treatment and across 12-month follow-up. Psychology Of Addictive Behaviors, 17(1), 73–82. [PubMed: 12665084]

Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, & Conde JG(2009 ). Conde, Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. Journal of Biomedical Informatics, 42(2), 377–381. [PubMed: 18929686]

Harzke AJ, Williams ML, & Bowen AM (2009). Binge use of crack cocaine and sexual risk behaviors among African-American, HIV-positive users. AIDS and Behavior, 13(6), 1106–1118. [PubMed: 18758935]

Kanter JW, Mulick P, & Martell C (2004). The behavioral activation scale. Milwaukee: University of Wisconsin-Milwaukee.

Karila L, Reynaud M, Aubin HJ, Rolland B, Guardia D, Cottencin O, & Benyamina A (2011). Pharmacological treatments for cocaine dependence: Is there something new? Current Pharmaceutical Design, 17(14), 1359–1368. [PubMed: 21524259]

Karila L, Weinstein A, Aubin HJ, Benyamina A, Reynaud M, & Batki SL (2010). Pharmacological approaches to methamphetamine dependence: A focused review. British Journal of Clinical Pharmacology, 69(6), 578–592. [PubMed: 20565449]

Klinkenberg WD, & Sacks S (2004). Mental disorders and drug abuse in persons living with HIV/AIDS. AIDS Care, 16(Supp1), S22–S45. [PubMed: 15736820]

Lee NK, & Rawson RA (2008). A systematic review of cognitive and behavioural therapies for methamphetamine dependence. Drug and Alcohol Review, 27, 309–317. [PubMed: 18368613]

Leventhal AM, Brightman M, Ameringer KJ, Greenberg J, Mickens L, Ray LA, & Sussman S (2010). Anhedonia associated with stimulant use and dependence in a population-based sample of

American adults. Experimental and Clinical Psychopharmacology, 18(6), 562–569. [PubMed: 21186931]

Marquez C, Mitchell SJ, Hare CB, John M, & Klausner JD (2009). Methamphetamine use, sexual activity, patient-provider communication, and medication adherence among HIV-infected patients in care, San Francisco 2004–2006. AIDS Care, 21(5), 575–582. [PubMed: 19444665]

Martell C (2003). Behavioral activation therapy for depression In O'Donohue WF & Hayes J (Eds.), Cognitive behavior therapy: ApplyingEmpirically supported techniques (pp. 28–32). New York, NY: John Wiley & Sons.

McLellan AT, Luborsky L, Woody GE, & O'Brien CP (1980). An improved diagnostic evaluation instrument for substance abuse patients. The addiction severity index. Journal of Nervous and Mental Disease, 168(1), 26–33. [PubMed: 7351540]

Meade CS, Conn NA, Skalski LM, & Safren SA (2011). Neurocognitive impairment and medication adherence in HIV patients with and without cocaine dependence. Journal of Behavioral Medicine, 34(2), 128–138. [PubMed: 20857187]

Menza TW, Jameson DR, Hughes JP, Colfax GN, Shoptaw S, & Golden MR (2010). Contingency management to reduce methamphetamine use and sexual risk among men who have sex with men: A randomized controlled trial. BMC Public Health, 10, 774. [PubMed: 21172026]

Metsch LR, Pereyra M, Messinger S, Del Rio C, Strathdee SA, Anderson-Mahoney P, . . . Gardner L (2008). HIV transmission risk behaviors among HIV-infected persons who are successfully linked to care. Clinical Infectious Diseases, 47(4), 577–584. [PubMed: 18624629]

Mimiaga MJ, Fair AD, Mayer KH, Koenen K, Gortmaker S, Tetu AM, & Safren SA (2008). Experiences and sexual behaviors of HIV-infected MSM who acquired HIV in the context of crystal methamphetamine use. AIDS Education and Prevention, 20(1), 30–41. [PubMed: 18312065]

Mimiaga MJ, O'Cleirigh C, Biello KB, Robertson AM, Safren SA, Coates TJ, . . . Mayer KH (2015). The effect of psychosocial syndemic production on 4-year HIV incidence and risk behavior in a large cohort of sexually active men who have sex with men. Journal of Acquired Immune Deficiency Syndromes, 68(3), 329–336. [PubMed: 25501609]

Mimiaga MJ, Reisner SL, Grasso C, Crane HM, Safren SA, Kitahata MM, . . . Mayer KH (2013). Substance use among HIV-infected patients engaged in primary care in the United States: Findings from the centers for AIDS research network of integrated clinical systems cohort. American Journal of Public Health, 103(8), 1457–1467. [PubMed: 23763417]

Mimiaga MJ, Reisner SL, Pantalone DW, O'Cleirigh C, Mayer KH, & Safren SA(2012). A pilot trial of integrated behavioral activation and sexual risk reduction counseling for HIV-uninfected men who have sex with men abusing crystal methamphetamine. Aids Patient Care and STDS, 26(11), 681–693. [PubMed: 23030605]

Petry NM, Alessi SM, Marx J, Austin M, & Tardif M (2005). Vouchers versus prizes: Contingency management treatment of substance abusers in community settings. Journal of Consulting and Clinical Psychology, 73(6), 1005–1014. 2005–16405-002 [pii]. [PubMed: 16392974]

Radloff LS (1977). The CES-D scale: A self-report depression scale for research in the general population. Applied Psychological Measurement, 1, 385–401.

Rafie C, Campa A, Smith S, Huffman F, Newman F, & Baum MK (2011). Cocaine reduces thymic endocrine function: Another mechanism for accelerated HIV disease progression. AIDS Research and Human Retroviruses, 27(8), 815–822. [PubMed: 21142650]

Rajasingham R, Mimiaga MJ, White JM, Pinkston MM, Baden RP, & Mitty JA (2012). A systematic review of behavioral and treatment outcome studies among HIV-infected men who have sex with men who abuse crystal methamphetamine. AIDS Patient Care and STDs, 26(1), 36–52. [PubMed: 22070609]

Roll JM, & Shoptaw S (2006). Contingency management: Schedule effects. Psychiatry Research, 144(1), 91–93. [PubMed: 16905197]

Rounsaville BJ, Carroll KM, & Onken LS (2001). A stage model of behavioral therapies research: Getting started and moving on from stage I.clinical psychology. Science and Practice, 8, 133–42.

Sheehan DV, Lecrubier Y, Harnett-Sheehan K, Janavs J, Weiller E, Bonara LI, & Dunbar GC (1997). Reliability and validity of the MINI International Neuropsychiatric Interview (M.I.N.I.): According to the SCID-P. Psychiatry, 12, 232–241.

Shoptaw S, Klausner JD, Reback CJ, Tierney S, Stansell J, Hare CB, & Dang J (2006). A public health response to the methamphetamine epidemic: The implementation of contingency management to treat methamphetamine dependence. BMC Public Health, 6(1), 214. [PubMed: 16919170]

Silverman K, Robles E, Mudric T, Bigelow G, & Stitzer M (2004). A randomized trial of long-term reinforcement of cocaine abstinence in methadone-maintained patients who inject drugs. Journal of Consulting and Clinical Psychology, 72(5), 839–854. [PubMed: 15482042]

Simoni JM, Kurth AE, Pearson CR, Pantalone DW, Merrill JO, & Frick PA (2006). Self-report measures of antiretroviral therapy adherence: A review with recommendations for HIV research and clinical management. AIDS and Behavior, 10(3), 227–245. [PubMed: 16783535]

Vocci FJ, & Montoya ID (2009). Psychological treatments for stimulant misuse, comparing and contrasting those for amphetamine dependence and those for cocaine dependence. Current Opinion in Psychiatry, 22(3), 263–268. [PubMed: 19307968]

Vogenthaler NS, Hadley C, Lewis SJ, Rodriguez AE, Metsch LR, & del Rio C (2010). Food insufficiency among HIV-infected crack-cocaine users in Atlanta and Miami. Public Health Nutrition, 13(9), 1478–1484. [PubMed: 20074395]

Walsh JC, Mandalia S, & Gazzard BG (2002). Responses to a 1-month self-report on adherence to antiretroviral therapy are consistent with electronic data and virological treatment outcome. AIDS, 16(2), 269–277. [PubMed: 11807312]