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Application of the Social Action Theory to Understand Factors Associated with Risky Sexual Behavior among Individuals in Residential Substance Abuse Treatment

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Abstract

Risky sexual behavior (RSB) is a leading cause of HIV/AIDS, particularly among urban substance users. Using the Social Action Theory, an integrative systems model of sociocognitive, motivational and environmental influences, as a guiding framework, the current study examined 1) environmental influences; 2) psychopathology and affect; 3) HIV-related attitudes and knowledge; and 4) self-regulatory skills/deficits as factors associated with event-level condom use (CU) among a sample of 156 substance users residing at a residential substance abuse treatment center (M age = 41.85; SD = 8.59; 75% male). RSB was assessed using event-level measurement of condom use (CU) given its advantages for improved accuracy of recall and ability for an examination of situational variables. A logistic regression predicting event level CU indicated the significant contribution of partner-type (environmental influences), less favorable attitudes towards condoms (HIV-related attitudes and knowledge), and higher levels of risk-taking propensity (self-regulatory skills/deficits) in predicting greater likelihood of not having used a condom at one's most recent sexual encounter. This study

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contributes to the literature examining HIV risk behaviors among substance users within a theory-driven model of risk.

Keywords

Risky sexual behavior; Event-level; HIV; Substance Users

Despite advances in HIV prevention efforts, an estimated 1.1 million individuals are living with HIV/AIDS in the United States (Centers for Disease Control and Prevention, 2008), and approximately 56,300 new infections occurred in 2006 (Hall et al., 2008). Risky sexual behavior (RSB) is currently the most common means of acquiring HIV; approximately 83% of new infections are acquired through sexual transmission (Centers for Disease Control and Prevention, 2008). Individuals who engage in illicit substance use are especially vulnerable to the contraction of HIV through risky sexual practices (e.g., Hoffman, Klein, Eber, & Crosby, 2000). Risk is increased further when considering individuals living in low-income urban areas where HIV risk factors including injection drug use and prostitution occur at higher rates than most other settings (Adimora, & Schoenbach, 2005; Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005). Given the elevated HIV risk via sexual transmission in urban, substance using populations, there is a clear need to understand the processes underlying RSB in this specific population.

In previous research, a variety of variables have been found to be related to RSB including demographic/background variables such as age, gender, ethnicity, and education (e.g., Avants, Marcotte, Arnold, & Margolin, 2003; Ensminger, Anthony, & McCord, 1997; Johnson, Cunningham-Williams, & Cottler, 2003; Miller & Neaigus, 2002), HIV status (Kalichman, Rompa, & Webster, 2002; Semple, Patterson, & Grant, 2000), past experience of sexual or emotional abuse (Arriola, Loudon, Dolren, & Fortenberry, 2005; Senn, Carey, Vanable, Coury-Doniger, & Urban, 2006), disinhibition (Hayaki, Anderson, & Stein, 2006; Lejuez, Simmons, Aclin, Daughters, & Dvir, 2004), negative emotionality and affect (Lehrer, Shrier, Gortmaker, & Buka, 2006; Mustanski, 2007), psychopathology (Johnson et al., 2003; McMahon, Malow, Devieux, Rosenberg, & Jennings, 2008), general self-esteem (Semple, Grant, & Patterson, 2005), partner type (Macaluso, Deman, Artz, & Hook, 2000), and attitudes towards condoms (Somlai et al., 2000). This body of work provides important insight into understanding RSB among urban substance users; yet, there remain open directions for future inquiry. Specifically, there is a need to utilize a theoretical framework in order to understand the interplay of key variables underlying RSB among urban substance users.

In considering frameworks to understand and intervene on RSB, social-cognitive based models have most often been applied and used to guide interventions. Social-cognitive theory highlights ways in which peoples' beliefs about their personal capabilities, or self-efficacy, influence their attempts to alter ingrained habits (Bandura, 1986). Social-cognitive informed interventions most frequently include the provision of basic HIV information, risk personalization, modeling, skills building (including problem solving and relapse prevention) and to a lesser extent social support enhancement (van Empelen et al., 2003). While these social-cognitive interventions have been shown to be relatively successful in reducing RSB among drug users (see van Empelen et al., 2003 for a review), there is a clear need for further improvement. Specifically, researchers have identified that the social-cognitive models have failed to account for self-regulatory processes and contextual factors (Bagozzi, 1992; Gollwitzer, 1990; Schwarzer, 1992). Yet, these internal and environmental context factors need to be altered or mobilized to support health risk behavior self-change (Ewart, in press) and may be of particular importance for urban substance users considering noted difficulties in self-regulation (Palfai, 2006) and high environmental risk (Adimora & Schoenbach, 2005).

Moving in this direction, the Social Action Theory (SAT), an integrative systems model of social-motivational, cognitive, and environmental processes, may provide a novel and potentially productive framework for understanding RSB among urban substance users (Ewart, in press; 1991). SAT was developed as an extension of individual-level psychological theories to address the broad complexities of public health problems. The overarching goal is the detection and manipulation of environmental and self-regulatory skills/deficits that can promote health and/or hinder health behaviors and habits (Johnson, Carrico, Chesney, & Morin, 2008). Initial conceptualizations of SAT focused on behavioral health more broadly defined. From these original roots, SAT has since been applied to HIV risk reduction and the prevention of HIV risk behavior (Gore-Felton et al., 2005; Lightfoot, Rotheram-Borus, Millburn, & Swendeman, 2005). For example, previous work has identified the domains of SAT, including contextual and self-regulatory skills/deficits, to be predictive of youth sexual behavior (Mellins, Dolezal, Brackis-Citt, Nicholson, & Meyer-Bahlburg, 2007).

SAT elaborates upon existing HIV-related social-cognitive models that emphasize cognitive appraisals and beliefs (e.g., Bandura, 1994; Fisher, Fisher, Williams, & Malloy, 1994) by focusing on social motivational and contextual influences that energize and shape behavior, specifically highlighting the ways in which important self-goals, frequently practiced routines, social-emotional competence, and social power affect substance use and other risky behaviors (Ewart, in press; Lightfoot et al., 2005). Applied to RSB, SAT views the choice of engaging in RSB as influenced by the personal regulatory resources and social power afforded by environmental context (variables that have historical impact on the individual as well as those relevant in the immediate context of the RSB) in combination with the individual's psychopathology and affect, HIV-related attitudes and knowledge, and self-regulatory skills/deficits.

Using SAT as a guiding framework, the current study sought to examine variables associated with event-level RSB among residents of an urban, substance-use treatment facility. In addition to demographic variables and HIV status, predictor variables used for this study were derived from four key domains of SAT: 1) environmental influences (i.e., childhood trauma and characteristics of last sexual intercourse); 2) forms of psychopathology and affect (substance use, depression, anxiety, borderline and antisocial personality disorders, and negative emotionality); 3) HIV-related attitudes and knowledge (condom attitudes and HIV knowledge); and 4) self-regulatory skills/deficits (trait nonplanning impulsivity, delay discounting, and risk-taking propensity). From these more general domains it is important to consider specific variables that capture the relevance of SAT to RSB.

To assess environmental influences on RSB, we utilized a measure of historical experience that would capture physical, emotional, and sexual childhood abuse. We also assessed the characteristics of the last sexual intercourse (using a measure adapted from Tortu et al., 2000) that included variables such as most recent partner type, whether or not this partner is an injection drug user, HIV positive, and/or having sexual intercourse with other people, as well as whether the participant was drunk or high at the last sexual encounter. These two measures capture historical as well as current environmental influences that may dispose one to engage in RSB by shaping social motives, self-regulatory skills/deficits, and social power in risky situations.

The components of the second domain of SAT, forms of psychopathology and affect, are conceptualized as factors that may interfere with one's ability to self-regulate (i.e., engage in safe sexual practices). To assess psychopathology and affect, we used the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, 4th. Edition (DSM-IV), non-patient version (SCID-IV-NP; First, Spitzer, Gibbon, & Williams, 2001) to assess for the presence of Axis I and Axis II disorders that may be related to RSB engagement. Specifically,

the diagnoses most related to internal-affective states included mood and anxiety disorders, borderline personality disorder (BPD), and antisocial personality disorder (ASPD). In addition to diagnostic status, we also included continuous measures of substance use frequency, as well as negative emotionality. Coupling diagnostic information with continuous information related to substance use frequency and affect captures a full picture of the psychopathology/affect domain conceptualized by SAT as being related to RSB.

To assess forms of knowledge and attitudes related to HIV, we utilized the Attitudes towards Condom Scale (Somlai et al., 2000), which assesses not only negative attitudes related to condom use, but also perceived barriers related to condom non-use. We also assessed HIV knowledge using an adapted survey from the Center for AIDS Intervention Research (CAIR; see Somlai et al., 2000), which assessed participants' understanding of HIV/AIDS risk, risk reduction steps, and condom usage. The combination of assessing condom attitudes and HIV knowledge encompasses the third domain of SAT related to RSB.

In the assessment of the final domain of SAT, self-regulatory skills/deficits, we used a battery of disinhibition measures. We included trait nonplanning impulsivity (which assesses not planning for the future, lack of self-control and intolerance of cognitive complexity) given its link to self-regulatory skills/deficits defined by the SAT. We assessed delay discounting using the Delay Discounting Task (DDT; Kirby, Petry, & Bickel, 1999), which captures the degree to which an individual shows preference for either small, immediate rewards or larger, delayed rewards, and fits with the social-emotional competence component of SAT given its relation to factors associated with condom use decision-making. To supplement self-report assessment with behavioral assessment of disinhibition, we also utilized the Balloon Analogue Risk Task (BART; Lejuez et al., 2002) to assess risk-taking propensity, a variable previously demonstrated to be associated with RSB in this type of sample (Lejuez et al., 2004). SAT considers RSB to result from self-regulatory skills/deficits as they relate to motivation and problem solving (Ewart, in press; 1991); this battery of behavioral and self-report measures of disinhibition address the self-regulatory skills/deficits delineated by SAT to be related to RSB.

Regarding our main outcome, RSB is often assessed using global association measures that include questioning one's general frequency of RSB during a given period of time (e.g., six months; Somlai, Kelly, McAuliffe, Ksobiech, & Hackle, 2003; Ross, Hwang, Zack, Bull, & Williams, 2002; Sanchez, Comerford, Chitwood, Fernandez, & McCoy, 2002). Although useful in many respects, global assessment of past frequency of RSB is subject to inaccuracy of recall and gross frequency count biases (Chawarski, Pakes, & Schottenfeld, 1998). Further, this method of assessment provides little information in terms of situational or context-specific conditions, resulting in condom use being treated a context-independent outcome (Kiene, Barta, Tennen, & Armeli, 2009; Weinhardt & Carey, 2000).

To address the limitations of global assessment of RSB, the utilization of event-level measurement (Leonard, & Ross, 1997; Temple, & Leigh, 1992) has been introduced into research concerning HIV-risk behavior (e.g. Gillmore et al., 2002; Tortu et al., 2000). Event-level measurement typically assesses particular aspects of a recent sexual event, such as type of partner and whether one was under the influence of alcohol. In event-level measurement, participants describe behavior during a particular event rather than report general trends or averages of behavior (LaBrie, Earleywine, Schiffman, Pederson, & Marriot, 2005). Despite the potential limitations of underreporting due to forgetting of events (Schroder, Carey, & Vanable, 2003) and the lack of estimate of overall likelihood of RSB, event-level measurement is thought to avoid over-reporting and rounding and allows for an examination of situational variables (Kiene et al., 2009).

Few studies have used this event-level methodology with at-risk samples of substance users and within a more comprehensive theory-driven model of risk. Indeed, event-level studies largely are limited to samples including college students (e.g., Brown, & Venable, 2007; LaBrie et al., 2005) and non-substance dependent adult samples (e.g., Ibañez, Van Oss Marin, Willarreal, & Gomez, 2005; Leonard, & Ross, 1997). Of the studies that have utilized event-level data among substance users (e.g., Leigh, Ames, & Stacy, 2008; Scheidt, & Windle, 1996; Tortu et al., 2000; Watkins, Metzger, Woody, & McLellan, 1993), the predictors have largely focused on the effect of intoxication, sexual history (Scheidt, & Windle, 1996), and drug use severity (Scheidt, & Windle, 1996; Watkins et al., 1993), and have rarely been incorporated into a broader model of risk. In sum, the current study examined four components of SAT in relation to event-level CU among a sample of substance users in residential substance abuse treatment.

METHOD

Participants

Participants included 161 men and women receiving treatment at the Salvation Army Harbor Light residential substance abuse treatment facility located in northeast Washington, DC. Five individuals were found to meet DSM-IV criteria for psychosis and thus were excluded from further analyses. The final sample ($n = 156$) ranged in age from 18 to 60, with a mean age of 42.85 years ($SD = 8.59$). Of the sample, 54.6% were crack/cocaine dependent, 15.1% heroin dependent, 10.6% marijuana dependent, and 34.3% alcohol dependent (of note adds up to more than 100% due to the fact that could be dependent on more than one drug). 25.0% did not meet any dependence criteria, 44.3% were dependent on one drug, 23.6% were dependent on two drugs, 5.0% were dependent on three drugs, and 2.1% were dependent on four drugs. With regard to racial/ethnic background, 86.5% of the participants were African American, 7.1% were White, 1.9% were Hispanic/Latino, 1.3% were Native American, and 3.2% reported "other." In terms of highest education level, 20.0% had not completed high school, 40.0% completed high school (or received a GED), and 40.0% completed at least some college, technical, or trade school. The majority of the sample reported current unemployment and 53.9% reported a household income of less than \$10,000 a year. Patients entered the treatment center either voluntary or under a pretrial-release-to-treatment program through the District of Columbia Pretrial Services Agency (53.3%). This program offers drug offenders who are awaiting trial the option to receive substance abuse treatment as a way to ensure appearance in court, provide community safety, and address an underlying cause of recidivism. Patients were contracted to a specific length of stay upon entry into the treatment center. For the current sample, contract lengths included 30 days (41.4%), 60 days (29.7%), 90 days (6.3%), or 180 days (22.6%).

Procedures

Assessment sessions were held on Friday afternoons in a private room at the Salvation Army Harbor Light facility. Residents at the treatment center were approached and asked if they would be willing to participate in a study examining sexual behavior among substance users. They were told that the session would last up to 3 hours and that they would be paid \$25 in the form of a grocery store gift card upon discharge from treatment. Interested participants were given a more detailed explanation of the procedures and asked to provide written informed consent approved by the University of Maryland Institutional Review Board. Given issues of reading comprehension, efforts were made to ensure that participants understood all facets of the consent form and the study itself. Next, a diagnostic interview, the Structured Clinical Interview for DSM-IV, non-patient version (SCID-IV-NP; First, Spitzer, Gibbon, & Williams, 2001), was administered in a separate private room by a trained senior research staff member. If not eligible following the SCID-IV-NP due to the presence of psychotic symptoms,

participants were debriefed and paid \$10 in grocery gift cards for their time. Following completion of the diagnostic interview, the participants completed a battery of questionnaires (described in detail below).

While the participants were completing the questionnaires, individuals trained in administering the behavioral task took participants one by one into an adjacent room where they completed the computer task (i.e., BART). The order of completion of the questionnaires was counterbalanced across participants. For entry into the treatment center (independent of the current study), individuals were required to evidence abstinence from all substance use and to have completed a detoxification program if needed. As a result, acute drug effects likely did not affect the participants' scores on the testing battery. Once the participants completed each aspect of the assessment session (i.e., clinical interview, questionnaire packet, and computer task), they were told how much money they earned and signed a receipt. This payment (\$25 in grocery store gift card) was deposited into their account at Harbor Light, which they received upon discharge from the residential treatment center.

Measures

Event-Level Assessment of Condom Use (Event-Level CU)—Participants reported whether a condom was used during their last sexual intercourse. This question, based on work by Tortu et al. (2000), served as the dichotomous dependent variable (coded: 0 = condom used, 1 = condom not used).

Demographic Information and HIV Status—A short self-report questionnaire was administered to obtain age, gender, race, education level, marital status, and total yearly income. Additionally, participants reported their HIV status.

SAT Derived Independent Variables

Domain 1: Environmental Influences

Domain 1: Environmental Influences: *Childhood Trauma*: As a measure of childhood trauma, we used the three abuse subscales (physical, emotional, and sexual) of the short form of the Childhood Trauma Questionnaire (Bernstein et al., 2003). The CTQ-SF assesses childhood maltreatment experiences (i.e., “while you were growing up”) using a 5-point scale ranging from 1 (*never true*) to 5 (*very often true*). The CTQ-SF shows convergent and discriminant validity with other trauma measures (Bernstein et al., 1994; Fink et al., 1995). Internal consistency for the scale was adequate with Cronbach's $\alpha = .94$.

Characteristics of Last Sexual Intercourse: Based on Tortu et al. (2000), we administered a 10-item questionnaire on one's most recent sexual intercourse. Contextual predictors of condom use from this measure included: type of partner that was involved in the most recent sexual intercourse encounter (commercial: defined as money or drugs being exchanged for sex; casual: defined as no committed relationship; or regular: defined as a committed relationship including a boyfriend/girlfriend or spouse), as well as whether or not this most recent partner was an injection drug user, HIV positive, and/or having sexual intercourse with other people. Further, the respondent was asked to indicate whether at their last sexual encounter they were drunk and/or high, and if they also engaged in oral or anal sex. Finally, the questionnaire asked whether the sexual encounter occurred in the last year.

Domain 2: Psychopathology and Affect

Domain 2: Psychopathology and Affect: *Psychopathology*: The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, 4th. Edition (DSM-IV), non-patient version (SCID-IV-NP; First et al., 2001) was used to determine the presence of

current Axis I disorders (i.e., clinical disorders) including depression, anxiety (presence of any anxiety disorder including panic, social phobia, generalized anxiety disorder, specific phobia, PTSD), psychosis (for exclusion criteria), and substance dependence, as well as, Axis II disorders (i.e., personality disorders) including borderline personality disorder (BPD) and antisocial personality disorder (ASPD). This measure has demonstrated reliability (First et al., 2001). All eligible participants were administered the interviews in a private area by trained research staff.

Substance Use Frequencies: Frequency of drug (i.e., marijuana, heroin, and crack/cocaine) and alcohol use was assessed with a standard substance use questionnaire modeled after the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Specifically, participants were asked how often they used each substance in the past year prior to treatment. Response options were: 0 (*never*), 1 (*one time*), 2 (*monthly or less*), 3 (*2–4 times a month*), 4 (*2–3 times a week*), and 5 (*4 or more times a week*). This measure was used to supplement dependence diagnoses from the SCID-IV-NP with more detailed information on substance use frequency.

Negative Emotionality: The Multidimensional Personality Questionnaire Brief Form (MPQ-BF; Patrick, Curtin, Tellegen, 2002) is a 155-item version of the original 300-item MPQ (Tellegen, 1982) developed to assess a variety of personality traits and temperamental dispositions. The higher order factor of Negative Emotionality (NEM) is comprised of the traits of Stress Reactivity, Alienation, and Aggression, and we utilized only this subscale given its previously demonstrated link to RSB (Lehrer et al., 2006). Internal consistency for the scale was good ($\alpha = .89$).

Domain 3: HIV-related Attitudes and Knowledge

Domain 3: HIV-related Attitudes and Knowledge: Condom Attitudes: The Attitudes towards Condoms Scale (Somlai et al., 2000) consists of 8 items focusing on negative attitudes regarding condom use and beliefs concerning barriers to condom use, such as perceptions and connotations of condom use, perceived unreliability of condoms in preventing sexually transmitted diseases, and embarrassment when purchasing condoms. The scale allows for level of agreement with each item using a 6-point Likert scale (from 1, *strongly disagree* to 6, *strongly agree*). A participant's negative attitudes toward condoms scale score reflects the mean of the 8 items, with higher values reflecting more negative attitudes toward condom use. Internal consistency for the scale was acceptable ($\alpha = .66$).

HIV Knowledge: Adapted from a survey developed by the Center for AIDS Intervention Research (CAIR; see Somlai et al., 2000), participants' understanding of HIV/AIDS risk, risk reduction steps, condom usage, and safer sex practices was assessed using a 22-item true-false scale. Scores on this scale range from 0 to 22, reflecting the number of questions correctly answered. Internal consistency for the scale was acceptable ($\alpha = .67$).

Domain 4: Self-Regulatory Skills/Deficits

Domain 4: Self-Regulatory Skills/Deficits: Trait Nonplanning Impulsivity: Trait-impulsivity was assessed using the Barratt Impulsiveness Scale, version 11 (BIS-11; Patton, Stanford, Barratt, 1995). The BIS-11 is a 30-item, self-report questionnaire that contains three subscales, which have been termed Motor Impulsiveness, Cognitive Impulsiveness, and Nonplanning. We utilized only the Nonplanning subscale, which we conceptualized as being most relevant to condom non-use given its focus on a lack of planning for the future, specifically targeting lack of self-control and intolerance of cognitive complexity. The questions require participants to rate how often a statement applies to them, according to the following scale: (1) *rarely/never*, (2) *occasionally*, (3) *often*, or (4) *always/almost always*. The BIS-11 has been

normed on a variety of sample populations, including college students, inpatient substance abusers, and prison inmates. Internal consistency for the scale was acceptable with Cronbach's $\alpha = .68$.

Delay Discounting: Developed by Kirby et al. (1999), the Delay Discounting Task (DDT) provides a measure of the degree to which an individual shows preference for either small, immediate rewards or larger, delayed rewards, which may be stated as the rate at which the subjective value of deferred rewards decreases as a function of the delay until they are received. The DDT was provided in a paper-and-pencil format, consisting of a fixed set of 27 choices between smaller, immediate rewards and larger delayed rewards. For example, on the first trial, participants were asked "Would you prefer \$54 today, or \$55 in 117 days?" Delays included in this questionnaire ranged from 7 to 186 days. The presentation order of the delays was contrived so as not to correlate choice amounts, ratios, differences, delays, or discount rate implied by indifference to the two rewards. Previous research has shown that individual's discount curves are well described by the hyperbolic discount function (Mazur, 1987) $V = A / (1 + kD)$, in which V is the present value of the delayed reward A at delay D , and k is a free parameter that determines the discount rate. As k increases, the person discounts the future more steeply. Therefore, k can be thought of as an *impulsiveness parameter*, with higher values corresponding to higher levels of impulsiveness.

Risk-taking Propensity: The Balloon Analogue Risk Task (BART; Lejuez et al., 2002) was used as a behavioral measure of risk-taking propensity. In this task, the computer screen displays a small simulated balloon accompanied by a balloon pump. Participants are directed to pump the simulated balloon to earn as much money as possible, taking into consideration that the balloon can pop at any time. When a balloon explodes, all money in the temporary bank is lost and the next uninflated balloon appears on the screen. At any point during each balloon trial, the participant can stop pumping the balloon by clicking a "Collect \$\$\$" button, which transfers all money from a temporary bank to a permanent bank. After each balloon explosion or money collection, the participant's exposure to that balloon will end, and a new balloon will appear until a total of 20 balloons (i.e., trials) are completed. These 20 trials are comprised of different balloon types, all with the same probability of exploding. Participants are not given any detailed information about the probability of an explosion, but are told that at some point each balloon will explode and this explosion can occur as early as the first pump all the way up to the point at which the balloon expands as large as the computer screen. The primary dependent measure on the BART was the adjusted number of pumps across trials. An independent review by Harrison, Young, Butow, Salkkeld, and Soloman (2005) of state of the art risk measurement strategies identified the BART as having excellent reliability (test-retest) and validity (including convergent and divergent).

Data Analytic Strategy

Analyses were conducted with the dichotomous variable of condom use versus non-use as the dependent variable. Primary analyses began with descriptive statistics for the entire sample across the dependent variable of event-level CU as well as each of the variables in the four domains of SAT: 1) environmental influences; 2) psychopathology and affect; 3) HIV-related attitudes and knowledge; and 4) self-regulatory skills/deficits. Next, we examined differences between those who used a condom versus those who did not at the last sexual encounter on all study variables using paired samples t-tests and chi-square. Each variable found to significantly differ for the condom use versus non-use groups were included in a multivariate logistic regression analysis. All analyses used a two-tailed alpha of .05.

RESULTS

As a preliminary analysis, we examined the descriptives of the last sexual encounter for the whole sample as shown in Table 1. For the dependent variable, condom non-use, 66.0% reported not using a condom during this last sexual encounter. In terms of timing, 92.9% reported that the sexual intercourse occurred in the last year and 7.1% reported that the sexual encounter did not occur in the last year. Next, differences between those who used a condom versus not at last sexual encounter were examined; results are shown in Table 1. Of note, substance use frequencies were reported rather than dependence diagnoses given the more descriptive nature of continuous data, but it is notable that the same findings (non-significant relationships) were obtained when dependence diagnoses were used instead. Those who did and did not use a condom did not differ significantly on the following environmental influences: history of childhood trauma, whether the partner injected drugs with a needle, was HIV-positive, or was having intercourse with other people, or whether the participant was drunk or high during the last sexual intercourse. Those who did and did not use a condom did not differ significantly on the following psychopathology and affect variables: presence of a diagnosis of major depression, any anxiety disorder, BPD, or ASPD, negative emotionality, frequency of crack, heroin, alcohol, and marijuana use. Lastly, they also did not differ on HIV-related knowledge, or on the following self-regulatory skills/deficits: trait non-planning impulsivity, delay discounting (all $ps > .06$).

Those who used a condom were significantly older than those who did not use a condom ($t(154) = -1.99, p < .05$). The condom use versus non-use groups significantly differed on the type of relationship with the partner ($\chi^2(2, N = 156) = 11.03, p < .01$). A larger percentage of those who did not use a condom described their partner as regular. Those who did not use a condom scored higher on risk-taking propensity as indexed by the BART ($t(154) = -1.98, p < .05$). And finally, those who did not use a condom reported more negative attitudes towards condoms than those who did use a condom ($t(154) = -3.02, p < .01$).

Finally, we conducted a multivariate logistic regression analysis to determine the independent contribution of each variable related to condom non-use at a univariate level. Each independent variable found to have a significant univariate relationship to condom non-use was included in a multivariate logistic regression analysis. Results are reported in Table 2. Overall, the model correctly classified 71.8% of the sample. Age did not remain significant ($p > .05$). Partner type, risk-taking propensity, and condom attitudes each were significant. Specifically, respondents were significantly less likely to report unprotected sex with casual partners (Odds Ratio [OR] = 0.25, CI = 0.10–0.60, $p = .002$) and commercial partners (OR = 0.26, CI = 0.09–0.75, $p = .01$) compared to regular partners. For risk-taking propensity, a one unit increase in level of BART was associated with an approximately one and half greater likelihood of not having used a condom at last sexual intercourse (OR = 1.61, CI = 1.09–2.34, $p = .02$). Finally, a one unit increase in negative condom attitudes was associated with an approximately one and three quarter greater likelihood of not having used a condom at last sexual intercourse (OR = 1.78, CI = 1.11–2.85, $p = .02$).¹

¹We also conducted several follow-up analyses. First, we examined if the relationship of condom use with risk taking propensity as well as condom attitudes varied by partner type. The interactions of partner type and risk taking propensity (OR = 1.00, CI = 0.97–1.04, $p = .94$) and partner type and condom attitudes (OR = 1.36, CI = 0.71–2.60, $p = .36$) were not significant. Next, although there was not a significant association between being drunk or high and condom use, an interaction between partner type and being drunk or high was examined based on prior work demonstrating a significant interaction. The interaction of being drunk or high with partner type was not significant (OR = 2.05, CI = 0.66–6.33, $p = .21$). Finally we examined gender interactions with the variables significantly related to condom use based on the univariate findings as shown in Table 1. There was not a significant interaction of gender with partner type (OR = 1.05, CI = 0.28–3.93, $p = .94$), gender with condom attitudes (OR = 1.08, CI = 0.42–2.75, $p = .87$), or gender with risk taking propensity (OR = 1.02, CI = 0.97–1.07, $p = .43$).

DISCUSSION

This study sought to examine variables associated with condom use measured via event-level assessment among a sample of urban substance users. Utilizing the Social Action Theory (SAT) as a guiding framework, a variety of SAT derived predictors were examined including: 1) environmental influences (i.e., childhood trauma and characteristics of last sexual intercourse); 2) forms of psychopathology and affect (diagnoses of depression, anxiety, BPD, and ASPD, substance use frequencies, and negative emotionality); 3) HIV-related attitudes and knowledge (condom attitudes and HIV knowledge); and 4) self-regulatory skills/deficits (trait nonplanning impulsivity, delay discounting, and risk-taking propensity). Findings from the logistic regression indicated that regular partner type, higher levels of risk taking propensity, and negative condom attitudes all contributed uniquely to an increased likelihood of condom non-use.

These results represent one of the first attempts to apply the SAT to understanding the factors influencing RSB in an urban, largely minority, substance abusing sample utilizing event-level methodology. The selected independent variables represent a range of theoretically-relevant factors related to RSB according to SAT, and the final model supports several key aspects of SAT theory, specifically how it posits the various dimensions contribute to health risk behavior and in this case RSB. Specifically, the significance of contextual, cognitive, and self-regulatory factors suggests the utility of SAT. Although the findings leave questions open for future exploration, the resulting model for RSB is conceptually meaningful, as it suggests that having sex with a regular partner, having negative attitudes towards condoms, and being prone to take risks combine to confer a relationship with engagement in RSB (i.e., condom non-use). In the following sections we discuss the findings in the context of each SAT domain.

Within the domain of environmental influences, the finding that having sex with a regular partner was related to condom non-use is consistent with prior work with non-drug using samples (e.g., Macaluso et al., 2000), but deserves additional attention in considering its meaning in the context of this study sample (urban substance users). In many samples, the choice to have intercourse without a condom when one's partner is regular may be thought of as a fairly low-risk behavior. However, condom non-use even with a regular partner may pose elevated risk in this particular population given the prevalence of injection drug use, risky sexual behavior, and/or commercial sex in urban, substance using environments. Future studies would benefit from collecting more objective information on the regular partner, as this description may vary greatly among respondents, as well as determining the specific routines and situations in which sex with regular partners does or does not increase risk for condom non-use. This finding supports the proposal by van Empelen and colleagues (2003) to develop programs that specifically target safe sexual behaviors of drug users in the steady relationship context.

Also from the domain of environmental influences, an additional notable finding was that being drunk and/or high during the last incident of sexual intercourse was not significantly related to condom use. Although a common perception exists that alcohol and other substances negatively interfere with condom use, a variety of studies have questioned this notion and posited that one's likelihood to use a condom may remain unchanged regardless of intoxication state (e.g., Leigh et al., 2008; Weinhardt & Carey, 2000). In a chronic substance using sample, disentangling the effect of substance use on condom use is challenging, given that the pharmacological effects of different types of drugs have been shown to have different impacts on RSB (Leigh et al., 2008). In a recent study, only amphetamines (smoked or injected) were consistently related to decreased condom use; alcohol use was not related to decreased condom use, and cocaine and marijuana were not significantly related to condom use in either direction (Leigh et al., 2008). Thus, our finding that being drunk or high at the last sexual encounter was

not related to condom use may not be surprising when considered in the context of the existing literature, particularly given that the two most prevalent drug dependencies in our sample were cocaine (54.6%) and alcohol (34.3%). Another potential factor that may have limited a significant relationship between intoxication and condom use is the chronic nature of the sample's substance use. For the individuals in our sample, intoxication or activities aimed at future substance use often are pervasive aspects of daily routines, and therefore isolating acute pharmacological effects on condom use may be complicated.

Considering psychopathology and affect, no significant relationships with condom use emerged, which is consistent with a meta-analysis reporting no significant correlation between depressive symptomatology, anxiety, anger, and sexual risk taking (Crepaz & Marks, 2001). However, the absence of findings also may have been overly influenced by the timing of assessment. That is, diagnoses certainly vary over time and may have in fact had been relevant at the time of the last sexual encounter. As with more global measures of RSB, this type of timing issue is a weakness of event-level measurement across a variety of variables. Nevertheless, it is likely that this limitation is most impactful for variables assessing psychopathology as compared to more stable variables such as attitudes and self-regulatory skills/deficits, suggesting the importance of future work considering other strategies to adequately assess the impact of these variables. It will be necessary to move beyond cross-sectional data and to examine within-person associations (Kalichman & Weinhardt, 2001). For example, using an online diary, Mustanski (2007) found that lower levels of positive affect are related to increased sexual risk behaviors. The diary method offers the advantage of a short time period between behavior and recording allowing for detailed information about the co-occurrence of events and moods which fits well with the internal and environmental aspects of SAT.

Within the domain of HIV-related attitudes and knowledge, condom attitudes predicted event-level RSB. This finding supports previous studies that have demonstrated the relevance of condom attitudes in predicting RSB (e.g., Robertson, & Levin, 1999; Zamboni, Crawford, & Williams, 2000), and as such, intervention efforts that target condom attitudes as a means to increase safe sex practices (e.g., Jemmott, Jemmott, Braverman, & Fong, 2005; Wingood et al., 2006) may be useful to extend to urban substance using populations that face heightened HIV risk, with a particular focus on those with a propensity to take risks. The lack of significant relationship with HIV knowledge is consistent with prior research demonstrating that HIV/AIDS knowledge and perceived risk have little predictive value for safe sexual behavior (c.f. van Empelen et al., 2003). Findings for condom attitudes in spite of the absence of findings for HIV knowledge suggests that it is not necessarily what is known about the risks and consequences associated with HIV, but one's internal representation (attitudes in this case) resulting from knowledge and other external variables.

Finally, risk-taking propensity, as indexed by performance on the BART (a tendency that may limit self-regulatory resources) was related to condom non-use during one's last sexual encounter. This is consistent with the Lejuez et al. (2004) study that found risk-taking propensity, as indexed by the BART, to be significant predictor of RSB, measured globally, above and beyond a host of variables. These findings serve as an extension of previously published reports and suggest the value of adding behavioral assessments such as the BART in understanding RSB, given that they are not compromised by limitations in individuals' ability to recognize and report on their own behavioral tendencies (Tortu et al., 2000; Leigh, & Stahl, 1993). Interpreting the factors underlying this relationship is difficult as the current study fails to rule out the possibility that both RSB as well as risk-taking propensity are the consequences of immersion in a substance-using lifestyle, as well as the direct consequence of neurotoxic illicit drugs, such as crack/cocaine (Booth, Kwiatkowski, & Chitwood, 2000; Hoffman et al., 2000; Ross et al., 2002). Further, this study fails to explain why trait non-

planning and delay discounting, both variables within the disinhibition umbrella, were not related to condom use as previous work among substance using samples has found impulsivity, measured with the Eysenck I7 Questionnaire, to be a statistically significant predictor of sexual risk after adjusting for the effects of demographic variables and substance use frequency (Hayaki et al., 2006). Future studies should be designed to systematically tease apart the potential contributions of dispositional factors from long-term negative effects of drug use in trying to better understand the origins of RSB. Additionally, future work should also carefully consider the measurement of disinhibition as it is considered to be a multidimensional construct. It may be that certain aspects of disinhibition (e.g., risk taking propensity) may be related to RSB while others are not. It is necessary to parse apart the differential findings with various measures of disinhibition, particularly the lack of consistency with self-report and behavioral tasks and the lack of significant correlation, as was found in this study, between measures that tap disinhibition.

The current study has a number of strengths, including the use of an at-risk, underserved sample of urban, primarily minority substance users, the application of the SAT framework, and the application of event-level measurement and behavioral assessment of risk-taking propensity to this population. However, several limitations should also be considered in interpreting the results. As noted above, there were multiple confounds associated with timing. It is unclear the extent to which measurement of study variables at our assessment accurately represent the manifestation of that variable at the most recent sexual experience, with only the contextual variables affecting condom use being variables in our battery directly tied to the most recent sexual encounter (i.e., to what extent are current condom attitudes at the assessment similar to those at the most recent sexual encounter; could not using a condom impact one's condom attitudes). Also presenting interpretative challenges, the current study did not assess the precise timing of the last sexual encounter (just whether the sexual encounter occurred in the previous year), thereby preventing statistical control for important factors (e.g., how long ago the last sexual encounter took place) to assess the temporal relationship among the predictors and our outcome measure.

While the event-level measurement may help with over-reporting and rounding and allows for an examination of situational variables, it is also important to acknowledge its limitations. There is the potential that the event reported may not be representative of the participant's overall behavior, and therefore cannot provide information on cumulative risk. The single event does not allow within person comparisons on behavior with regard to the environmental variables assessed, such as partner type or substance use, leaving open questions about whether the individual participant's behavior varies with regard to these factors. Further, the event-level report is still retrospective. Future work examining person-level predictors (e.g. risk taking propensity, condom attitudes) in addition to event characteristics (e.g. intoxication state, partner type) would benefit from repeated sampling with techniques as a daily diary in order to determine which variables are consistently associated with discrete behavior. Further, there is some evidence that recalls up to 90 days are reliable (e.g., Ajzen & Fishbein, 2004; Jaccard, McDonald, Wan, Dittus, & Quinlan, 2002); thus, in future work it may be best to limit event-level measurement to sexual encounters within the last 90 days or to conduct a prospective study that attempts to link current variables with sexual behavior.

Another limitation is the failure to assess sexual orientation and/or gender of sexual partner, a necessary target for future work. A final limitation is the size of the sample. Although sample size is acceptable for main findings, a number of interactions were examined (see footnote) that were not found to be significant. Although power was indeed limited for these analyses, it is notable that the odds ratios and confidence ratios indicate that these were very modest. Nevertheless, future studies would benefit from larger samples to further evaluate the utility of the SAT model, including examination of potential interaction effects.

The current data support a model framed in SAT in which having sex with a regular partner, having negative attitudes towards condoms, and being prone to take risks combine to confer a relationship with engagement in RSB (i.e., condom non-use). Despite limitations and the questions raised by our findings, the current results add to the growing body of literature evaluating and predicting RSB within urban substance using populations and begins to lay the groundwork for future investigations that examine event-level RSB in the context of more elaborate environmental and self-regulatory predictors. By identifying personal and environmental self-regulatory resources that directly affect social interactions, problem solving, and self-efficacy, SAT applied to RSB has the potential to identify interventions that can be used to enhance health by altering self-goals, strategies, and environments. From a public health standpoint, identifying factors that influence HIV risk behaviors will continue to be critical, particularly as evidence grows suggesting that urban, minority substance users are at high risk for HIV infection.

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Table 1

Differences in condom use at last sexual intercourse

	Total Sample	Condom not used	Condom used	
Variable	M (SD) / %	M (SD) / %	M (SD) / %	t / χ^2
<i>Demographic Variables</i>				
Age	42.85 (8.59)	40.96 (9.48)	43.83 (7.97)	-1.99*
Gender (male)	75.0%	75.7%	73.6%	0.07
Marital Status				6.58
Single ⁺	69.0%	64.7%	77.4%	
Living with a partner was if married	8.4%	6.9%	11.3%	
Married but separated	11.6%	13.7%	7.5%	
Married	11.0%	14.7%	3.8%	
HIV-positive	8.0%	8.0%	8.0%	0.00
<i>Environmental Influences</i>				
CTQ-SF	27.50 (14.21)	27.62 (14.40)	27.26 (13.99)	-0.15
Partner injected drugs with needle				1.47
No ⁺	87.2%	89.3%	83.0%	
Yes	6.4%	5.8%	7.5%	
Don't Know	6.4%	4.9%	9.4%	
Partner HIV-positive				0.87
No ⁺	87.2%	88.3%	84.9%	
Yes	2.6%	2.9%	1.9%	
Don't Know	10.3%	8.7%	13.2%	
Partner having intercourse with other people				4.65
No ⁺	57.1%	63.1%	45.3%	
Yes	27.6%	24.3%	34.0%	
Don't Know	15.4%	12.6%	20.8%	
Drunk	24.4%	22.3%	28.3%	0.68
High	49.0%	56.6%	45.1%	1.84
Relationship with partner				11.03*
Regular ⁺	64.7%	73.8%	47.2%	
Casual	21.8%	15.5%	34.0%	
Commercial	13.5%	10.7%	18.9%	
<i>Psychopathology and Affect</i>				
Depression Diagnosis	28.8%	34.3%	17.6%	3.09
Anxiety Diagnosis	38.1%	39.4%	35.3%	0.17
BPD	30.8%	31.0%	30.3%	0.01
ASPD	27.6%	28.4%	25.7%	0.09
Crack use freq.	3.24 (2.05)	3.28 (2.00)	3.17 (2.17)	-0.32
Heroin use freq.	1.17 (1.95)	1.02 (1.90)	1.47 (2.01)	1.38
Alcohol use freq.	3.17 (2.02)	3.16 (2.02)	3.20 (2.04)	0.12

	Total Sample	Condom not used	Condom used	
Variable	M (SD) / %	M (SD) / %	M (SD) / %	<i>t</i> / χ^2
Marijuana use freq.	1.39 (1.81)	1.44 (1.80)	1.28 (1.84)	-0.51
Negative Emotionality	16.42 (8.17)	16.80 (8.52)	15.65 (7.45)	-0.82
<i>HIV-related Attitudes and Knowledge</i>				
Condom Attitudes	2.47 (0.88)	2.62 (0.85)	2.18 (0.87)	-3.02**
HIV Knowledge	17.31 (3.06)	17.16 (3.16)	17.61 (2.85)	0.85
<i>Self-Regulatory Skills/Deficits</i>				
Non-planning	26.99 (4.82)	26.57 (4.97)	27.79 (4.45)	1.49
Delay Discounting	0.11 (0.08)	0.11 (0.08)	0.11 (0.09)	-0.36
BART	40.26 (15.81)	42.04 (15.67)	36.80 (15.65)	-1.98*

Note. Dependent variable, condom use, was coded: 0 = *used condom*, 1 = *did not use condom*.

⁺ indicates reference group.

CTQ-SF = Childhood Trauma Questionnaire-Short Form. BPD = Borderline Personality Disorder. ASPD = Antisocial Personality Disorder. BART = Balloon Analogue Risk Task.

* $p < .05$.

** $p < .01$.

Table 2

Multivariate logistic regression predicting condom non-use at last sexual intercourse

Variable	<i>B</i>	<i>SE</i>	OR (95% CI)	<i>p</i>
Age	0.03	0.02	1.03 (0.98–1.08)	.19
Relationship to Partner				
Regular ⁺				
Casual	−1.41	0.46	0.25 (0.10–0.60)	.002
Commercial	−1.34	0.56	0.26 (0.09–0.75)	.01
Condom Attitudes	0.57	0.24	1.78 (1.11–2.85)	.02
BART	0.48	0.20	1.61 (1.09–2.34)	.02

Note. Dependent variable, condom use, was coded: 0 = *used condom*, 1 = *did not use condom*

⁺ indicates reference group. BART = Balloon Analogue Risk Task.