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Crack smokers' intention to use condoms with loved partners: intervention development using the theory of reasoned action, condom beliefs, and processes of change

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Abstract Prevalence rates of HIV infection acquired through heterosexual contacts have risen steadily since 1982. Crack cocaine smokers are at particular risk of HIV infection due to heterosexual exposure. HIV risk reduction interventions seeking to increase condom use among drug users have met with minimal success, and there is a need for interventions to be strongly grounded in psychosocial models of behaviour change. This study presents the results of an investigation of predictors of intention to use condoms and related therapy processes among heterosexual drug users. Data were analyzed from 586 crack smokers recruited in Washington, DC, Miami, Florida, and Collier County, Florida who reported having both primary and casual sex partners. Participants responded to items derived from the theory of reasoned action, the theory of planned behaviour and the transtheoretical model of change. Condom use beliefs and therapy processes used to initiate and maintain condom use were assessed. Outcome expectancies and normative beliefs were the strongest predictors of intention to use condoms with a primary sexual partner. In turn, beliefs that condoms inhibit sexual romance and decrease sexual pleasure strongly predicted outcome expectancies. Therapy processes found to be associated with these constructs included: self-liberation, counter conditioning and stimulus control/reinforcement. Results suggest that HIV risk reduction interventions using a group format and targeting condom beliefs related to sexual romance and pleasure will decrease negative outcome expectancies about condom use. Also, reinforcing attempts to use condoms with intimate partners should increase positive outcome expectancies and intention to initiate or maintain condoms with a primary sexual partner.

Introduction

The epidemic of HIV and other sexually transmitted diseases (STDs) has reached crisis proportions. During the first decade of the AIDS epidemic, investigations of the sexual transmission of HIV focused almost exclusively on male-to-male sex. In 1992, Steel and Haverkos noted that the definition of heterosexual transmission used by the Centers for

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Disease Control and Prevention (CDC) underestimated the risk of heterosexual transmission. Specifically, cases where people contracted the disease through unprotected sex with individuals who were not members of recognized risk groups were categorized as 'undetermined' causes. Between 1990 and 1997, the number of reported AIDS cases meeting the existing definition of heterosexual transmission more than quadrupled, and the number of 'undetermined' cases rose from 1.6 to 14% of the total AIDS caseload (CDC, 1999). Thus, male-to-female and female-to-male transmission of HIV, where neither partner is known to have engaged in any other HIV risk behaviour, appears to be increasing rapidly. These data strengthen the prediction that greater numbers of heterosexuals infected with HIV in the USA are one or more generations of risk removed from those infected in the 1980s (Haverkos, 1994).

Crack has been identified as an indirect factor in the heterosexual transmission of HIV. Crack smoking has been associated with the early onset (Fullilove & Fullilove, 1989) and high rates of sexual activity (Bowser, 1989; Fullilove *et al.*, 1990; Trapido *et al.*, 1990) for both males and females. Cocaine use, of which crack is the smokable form, has been found to stimulate sexual desire in some users (Steel & Haverkos, 1992). Injection drug users (IDUs) who inject cocaine or 'speedballs' (cocaine mixed with heroin) have more partners and more frequent sex than do IDUs who inject heroin alone (Longshore *et al.*, 1993). Female IDUs who also smoke crack have been found to have higher rates of unprotected intercourse with multiple partners compared to female IDUs who do not smoke crack (Knezek *et al.*, 1991). In crack houses, men and women often engage in frequent and prolonged vaginal intercourse without condom use (McCoy & Inciardi, 1995) that results in increased risk due to penile and vaginal bleeding. Sex in crack houses with numerous partners exposes both males and females to the semen of all participants, thus increasing in the risk of infection (McCoy & Inciardi, 1995). There is also some indication that cocaine use, including smoking crack, may facilitate the replication of HIV (Bagasra & Pomerantz, 1993).

Three behaviour change models have been widely used as the basis for developing HIV risk reduction interventions: Fishbein's theory of reasoned action (TRA; Fishbein & Ajzen, 1975), Ajzen's theory of planned behaviour (TPB; Ajzen, 1991) and Prochaska's transtheoretical model of change (TMC; Prochaska *et al.*, 1992). The TRA and TPB overlap in their identification of intention as the immediate precursor to behaviour, while TMC uses three stage designations to indicate intention to change (precontemplation, contemplation, preparation). Intention is generally a rating of the likelihood of performing a specific behaviour (TBP and TRA) or a yes/no response to the likelihood of *always* performing a specific behaviour in a specified time period (TMC). Thoughts and feelings related to intention and stage differ slightly across the three models, but generally include self-efficacy, outcome expectancies (or decisional balance) and normative beliefs. A unique feature of the TMC is the identification of therapy processes and their likely role in advancing a person from one stage to the next.

Outcome expectancies, in conjunction with the importance of each outcome, are key factors for motivating behaviour change (Ajzen, 1991; Ajzen & Madden, 1986; Fishbein & Ajzen, 1975; Fishbein *et al.*, 1994). Perceived importance of positive and negative outcome expectancies is associated with changes in stage for a variety of health behaviours (Prochaska *et al.*, 1994), including condom use (Bowen & Trotter, 1995). Cross-sectional research has shown that negative outcome expectancies outweigh positive outcome expectancies for individuals in the precontemplation stage. As individuals progress through the stages of change, positive outcome expectancies increase and negative outcome expectancies decrease for most health behaviours, thus reversing the relationship between the variables (Prochaska *et al.*, 1994). The importance of positive outcome expectancies for condom use (e.g.

condoms prevent disease) increases significantly as the stages of change progress. In contrast to other health behaviours, negative outcome expectancies (e.g. condoms reduce romance) remain high (Bowen & Trotter, 1995; Prochaska *et al.*, 1994), possibly increasing the relapse potential.

Perceived self-efficacy for performing a behaviour is another determinant of stage classification (Bowen & Trotter, 1995; DiClemente *et al.*, 1991; Galavotti *et al.*, 1995; Grimley *et al.*, 1993; Rhodes & Malotte, 1994), changes in behavioural intention (Ajzen & Madden, 1986) and HIV risk reduction (Bandura, 1990). DiClemente and colleagues (1991) found that persons in the precontemplation stage had lower perceived self-efficacy than did those in either the contemplation or preparation stages. Individuals in the preparation stage had the highest levels of perceived self-efficacy. Examination of predictors of stage of change for condom use indicates that high self-efficacy predicts inclusion in the preparation and action stages, but not in the precontemplation stage (Bowen & Trotter, 1995). For women, self-efficacy for condom use with primary and other sexual partners increases significantly across the stages (Galavotti *et al.*, 1995).

Subjective normative beliefs directly affect behavioural intention. The combination of an individual's belief about what significant others think they ought to do and his/her motivation to comply with those beliefs determine subjective normative beliefs. The relationship of normative beliefs to the initiation and maintenance of condom use has shown mixed results (Kashima *et al.*, 1993; Herold *et al.*, 1998; Kelly *et al.*, 1997). Norris and Ford (1995) found that significant others who talk more about condom use were more likely to use condoms. Others have suggested that primary sexual partner's condom use beliefs are the most significant predictors of condom use (Kippax *et al.*, 1998; Morrison *et al.*, 1995). These findings support the need for further examination of subjective norms among drug users.

Therapy processes, as identified by the TMC, are strategies and techniques used to change behaviour (DiClemente *et al.*, 1991; Prochaska *et al.*, 1992). Research shows that people in different stages of change spontaneously utilized different therapy processes (Prochaska *et al.*, 1992). Processes used in the earlier stages include negative outcome expectancies, consciousness raising, environmental reevaluation and self-reevaluation. Later-stage processes include self-liberation, reinforcement management and helping relationships. The application of a particular strategy, while highly relevant for persons in one stage, may be inappropriate for individuals in another stage. No research was found that indicated how these processes relate to the behavioural determinants (e.g. self-efficacy) of stage.

Early HIV risk reduction efforts targeting drug users tended to focus on the delivery of HIV risk reduction information to large numbers of individuals (Simpson *et al.*, 1994; Watters, 1987; Watters *et al.*, 1990). Unfortunately, these interventions often lacked conceptual coherence, and measures of risk and risk reduction were often restricted to overt behaviours (Simpson *et al.*, 1994; Stevens *et al.*, 1998). Theory-directed studies have been somewhat more successful in decreasing HIV risk related to needle use (Andersen *et al.*, 1993; Baker *et al.*, 1993; Bowen & Trotter, 1995; Corby *et al.*, 1996; Cottler *et al.*, 1998; Hawkins *et al.*, 1999; Mandell *et al.*, 1994; Rhodes & Malotte, 1996; Rhodes *et al.*, 1998; Robles *et al.*, 1998; Stark *et al.*, 1998); however, encouraging drug users to initiate and maintain condom use continues to be daunting. Although researchers have examined the relationship between self-efficacy, normative beliefs and outcome expectancies with intention to initiate or maintain condom use, drug users' specific condom use beliefs or utilization of therapy processes that facilitate condom use have not been investigated.

The purpose of this study was to identify the relationship between specific condom beliefs and outcome expectancies and examine the relationship between processes of change and predictors of intention to use condoms among heterosexual drug users. This study differs

from previous investigations of drug users' condom use in two ways. First, we identified crack users' specific condom beliefs, outcome expectancies and self-efficacy beliefs in an elicitation study (Williams *et al.*, 2000). We then constructed the specific questions for this study from these beliefs. Second, therapy processes were examined in relation to the precursors of intention to use condoms. Finally, our elicitation and other studies (Anderson *et al.*, 1999a; 1999b) have found that condom use was most difficult with primary (main/loved) sexual partners. Therefore, the scope of the analyses is limited to an investigation of condom use during vaginal sex with primary sexual partners.

Methods

Participants

Data for this study were collected from a total 635 heterosexual crack users interviewed between 1 January 1997 and 31 December 1997, in Miami, Florida, Collier County, Florida, and Washington, DC. The analytical sample used for analyses is composed of 586 individuals who reported primary and casual sexual partners. The participants were evenly distributed across the three localities and 54% of the sample was male. Gender was evenly distributed in Miami and Washington, while in Collier County 68% of participants were male. Each locality's racial/ethnic mix represented the racial/ethnic mix of its drug-using population. African Americans represented 99% of the Washington sample and slightly more than half of the Miami (52%) and Collier County (58%) samples. Participants ranged in age from 19 to 67 years. The average ages of participants across sites were as follows: Washington, $M = 36.58$ years ($SD = 6.87$); Miami, $M = 38.61$ years ($SD = 6.89$); and Collier County, $M = 38.43$ years ($SD = 9.22$). Participants in all three localities tended to be single, either never married or divorced. Educational attainment varied across localities, with 27% of the participants recruited in Collier County having less than an 8th grade education, compared to only 3% in both Miami and Washington. Numbers of participants with a high school diploma or its equivalent were lowest in Collier County, 34%, and moderately higher in Miami, 45%, and Washington, 42%.

Reported crack use was highest in Washington, where 66.9% of participants reported smoking crack more than 30 times per month, compared to 39.2% in Miami and only 3.7% in Collier County. The use of injected cocaine was highest among those recruited in Miami, where 14.9% reported injecting more than 30 times in the month before being interviewed. In comparison, 11.4% of the participants recruited in Washington reported injecting heroin more than 30 times. Only 1.1% of participants recruited in Collier County reported injecting heroin, and most of these reported injecting less than 30 times in the previous 30 days.

Procedure

Participants for this study were recruited using targeted sampling plans developed at each of the three localities (Booth *et al.*, 1993; Watters & Biernacki, 1989). Areas where drug users congregate were identified by correlating reports of arrests for possession or sale of drugs, prostitution, drug overdoses, sexually transmitted disease and HIV infection with zip code areas (Carlson *et al.*, 1994). Drug abuse in areas targeted for sampling was confirmed by observation of drug use and by information collected from key informants. Sampling in each city was also directed to ensure that both male and female drug users were recruited.

Participation in the study was limited to individuals who met the following criteria: at least 18 years of age, self-reported smoking crack cocaine, had a positive urine screen for

opiates or cocaine, self-reported having had vaginal sex at least once in the week before being interviewed, and were willing to sign an informed consent form. All study participants were informed of the intent of the study, were told that participation was voluntary, and were informed that they could refuse to answer specific questions if they did agree to participate. Committees for the protection of human subjects at each of the scientists' participating institutions approved study procedures and data collection forms.

Trained research assistants collected data in private offices located in settings close to where drug users were recruited. Administration of the questionnaire took approximately two hours. A ten-minute break was taken halfway through the two-hour procedure. Participants were paid \$20 for the 120-minute interview.

Measures

Data were collected using the Sexual Risk Reduction Questionnaire (SRRQ) developed specifically for this study. The two-part questionnaire was developed using findings gained during in-depth interviews conducted at all three localities. The data collected on the first part of the SRRQ includes sociodemographic, drug use behaviours, sexual behaviours, health status, HIV status and drug treatment history. The second part of SRRQ includes questions related to the constructs derived from the three behaviour change models: the theory of reasoned action, the theory of planned behaviour and the transtheoretical model. Constructs included normative beliefs, condom self-efficacy, outcome expectancies, intention to use condoms and processes of change.

Measures developed for this study were based on information from the interview study (Williams *et al.*, 2000) and adapted from measurement items used in previous studies (Albarracin *et al.*, 1998; Bowen & Trotter, 1995; Corby *et al.*, 1996; Fishbein *et al.*, 1991). Each question was rated in a two-step process where the participant first rated the question on a dichotomous scale (e.g. likely/unlikely) and then modified their answer using 'a little', 'fairly' or 'extremely'. This procedure resulted in a six-point Likert scale for each question.

Intention was the dependent variable. It was measured using a single item: 'How likely is it that you will use a condom with [name] in the next 30 days during vaginal intercourse?'. Responses to the item were measured using a scale similar to that used in previous studies examining condom use (Albarracin *et al.*, 1998; Corby *et al.*, 1996). Participants were asked to provide the name or initials of a primary (loved) sexual partner and rate the likelihood of condom use with this person. Because of the small number of responses in the 'slightly' and 'somewhat likely' categories, these were collapsed and the variable was recoded into a four-point scale.

Theory of planned behaviour variables. The questions in the theory section were subjected to principal components factor analysis, resulting in the three expected constructs (self-efficacy, normative beliefs and outcome expectancies) and a fourth single item construct (refusal). Items with item to factor correlations greater than 0.5 were used to construct the scales.

Condom use *self-efficacy* was measured using a three-item scale and assessed how 'sure' participants were that they could use condoms in a specific context. The coefficient alpha for the scale was 0.72. *Normative beliefs* about condom use measure was composed of three items. This scales measured how 'sure' participants were that significant others used condoms or thought the respondent should use condoms. The alpha score for the normative beliefs measure was 0.58. *Outcome expectancies* were measured using a three-item scale and assessed how "pleasant" the respondent felt that specific outcomes of condom use would be. The

alpha score for the outcome expectancies measure was 0.77. A *refusal to use condoms* measure was comprised of one item. The item was originally conceived as an outcome expectancy measure. However, the principal component analysis revealed that this item constituted a distinct construct.

Condom beliefs. Twenty items measuring specific beliefs about condom use were developed based on results of the elicitation with a similar sample of drug users (Williams *et al.*, 2000). Responses were measured using a six-point Likert-type scale that ranged from 1 (disagree a lot) to 6 (agree a lot). Five meaningful scales emerged from the principal components analysis. The *condoms block romance* scale included six items measuring the perceived effects condoms have on sexual romance. The alpha score for the scale was 0.78. A four-item *condom pleasure* scale measured the perceived pleasure that condoms might add to a sexual encounter. The alpha score for the scale was 0.58. The scale measuring negative outcome expectations regarding condom use, *condoms are bad*, included four items. The alpha score of this scale was 0.67. The negative physical effects of condom use, *condom problems scale*, included three items. The alpha for the scale was 0.69. Finally, the disease prevention benefits of condom use, *condoms protect*, was composed of three items. The alpha score for this measure was 0.69.

Processes of change. Forty questionnaire items were adapted from the Processes of Change Questionnaire (Prochaska *et al.*, 1988) to reflect *processes of change* for condom use and AIDS risks. Questions were written to include the ten processes: helping relationships, stimulus control, self-reinforcement, counter conditioning, distraction, dramatic relief, consciousness raising, social liberation, self-liberation and environmental reevaluation. Each item was measured using a six-point Likert type scale ranging from 1 (disagree a lot) to 6 (agree a lot).

Principal component analysis of the items revealed seven meaningful constructs. A measure of *behavioural control* (stimulus control/reinforcement) related to condom use was composed of five items. The alpha score for the scale was 0.81. The *social liberation* scale included two items, with an alpha score of 0.59. The *dramatic relief* scale was composed of four items, with an alpha score of 0.68. *Consciousness raising (AIDS)* was composed of three items, with an alpha score of 0.74. The *consciousness raising (condoms)* scale was composed of four items related to telling oneself that condom use was possible and having others to talk to about condom use. The alpha score for the scale was 0.56. Two items comprised the *counter conditioning* scale. This scale measured the ability to distract oneself from thoughts of sex without a condom. The alpha score for the measure was 0.55. The final scale, *self-liberation*, was composed of two items measuring beliefs about the effect of the participant having AIDS on important others. This measure had an alpha score of 0.60.

Analyses

To achieve a fully specified model of the determinants of the participants intention to use condoms with their primary sexual partner, data were analyzed in four steps.

Step 1. Demographics. Demographic variables that related to intention were examined. Differences across levels of intention for marital status, gender, race/ethnicity and children living in the home were examined using a Kruskal-Wallis test. Variables were kept if the significance level was greater than 0.05.

Step 2. Predictors of intention. Regression models were used to identify predictors of intention and outcome expectancies. Three stepwise logistic regressions were run to identify constructs that predicted greater intention. The dependent variable for the first regression was 'extremely unlikely' versus all greater levels of intention ('unlikely', 'likely' and 'extremely likely'). The second compared 'unlikely' to 'likely' and 'extremely likely', and the third compared 'likely' to 'extremely likely' in the manner of Stark *et al.* (1998). Predictors included self-efficacy, outcome expectancies, normative beliefs, the five condom belief scales and the significant demographic variables from Step 1. Condom beliefs that were important predictors of outcome expectancies were identified using ordinary least squares regression.

Step 3. Processes of change. Five ordinary least squares regression models were used to identify significant processes of change related to self-efficacy (1): outcome expectancies (2), normative beliefs (3), and the two condom beliefs (4 and 5). The seven processes of change constructs were entered into the models as independent variables. The sample used to conduct these regressions was restricted to 201 participants who completed the process items for primary partners. The remaining participants completed the items for either casual partners or paying partners.

Step 4. Multivariate model. The last step of the analyses was to develop a multivariate model of drug users' condom use with primary sexual partners using structural equation modeling. Variables found to be significant in the prior steps were entered into the model. The model was reduced to produce a final model that included only significant variables.

Results

Demographics

Gender, race (African American, Caucasian, Hispanic), marital status (married/living as married versus single) and children living in the home were examined. Kruskal-Wallis tests for differences across levels of intention showed that age and having at least one child in the home differed significantly (Table 1). Participants who reported one or more children living in the home, had significantly lower intention to use a condom ($\chi^2(3, N = 532) = 11.34, p = 0.01$), and that older participants had higher intentions to use condoms ($\chi^2(3, N = 532) = 9.93, p = 0.02$). The more crack a participant smoked, the lower was his/her intention to use condoms ($\chi^2(3, N = 532) = 11.50, p = 0.01$). There were no significant differences in intention to use condoms among different rates of heroin injection or cocaine injectors.

Means and standard deviations were computed for the self-efficacy, normative beliefs, outcome expectancies and condom belief scales across the four levels of intention to use condoms. As shown in Table 2, the means for the four constructs increased across the levels of intention, as would be predicted by the behaviour change models. Three logistic regression models were calculated using the significant demographic variables and the four theory driven scales as predictors of intention to use condoms. The dependent variable for each model was: (1) 'extremely unlikely' versus all higher intention levels; (2) 'unlikely' versus 'likely' and 'extremely likely'; and (3) 'likely' versus 'extremely likely'. Significant odds ratios, 95% confidence intervals and overall goodness-of-fit measures are shown in Table 3. Hosmer-Lemeshow goodness of fit test indicated that all three models provide a good fit to the data. Age was the only demographic variable that continued to be a significant predictor.

Table 1. Demographic variables across intention to use condoms

	EU ^a	U ^b	L ^c	EL ^d	
Sample size (N)	296 (%)	72 (%)	43 (%)	175 (%)	χ^2
Gender (male)	25.4	6.7	4.9	17.9	NS
Age					
19–29	7.0	1.7	0.7	4.4	9.93*
30–39	24.7	6.0	2.2	12.1	
40–49	16.4	4.3	3.2	10.6	
50–67	2.4	0.3	1.2	2.7	
Race					
African American	33.8	8.9	5.3	21.2	NS
Caucasian	9.6	2.1	0.9	6.0	
Hispanic	6.0	0.7	0.9	2.2	
Marital status (married/living as married)					
10.3	10.3	2.7	1.0	3.9	NS
Children in home (Yes)	15.7	3.2	0.7	6.7	11.34**

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. ^a EU = extremely unlikely, ^b U = unlikely, ^c L = likely, ^d EL = extremely likely.

Self-efficacy, outcome expectancies, and normative beliefs measures were significant in at least one regression model.

The relationship between the five condom belief scales and outcome expectancies was examined using ordinary least squares regression (Table 4). Two condom beliefs were significant: condom romance ($B = -0.35$, $r = -0.28$, $p < 0.00$) and condom pleasure ($B = 0.32$, $r = 0.25$, $p < 0.00$). These two variables accounted for 12% of the variance.

Identification of therapy processes

Identification of therapy processes that significantly predict self-efficacy, outcome expectancies, normative beliefs and two condom beliefs were identified using six multiple regression models. Table 5 shows the unstandardized regression coefficients (B), standardized regression coefficients (β), correlation coefficient (r), variance explained (R^2) and adjusted variance explained (adjusted R^2).

The behavioural control construct was related to four variables: outcome expectancies, normative beliefs, condom romance and condom pleasure. Counter-conditioning was related to both outcome expectancies and condom romance. Social liberation was found to be a

Table 2. Means and standard deviations for theory guided negative outcome expectancies across four levels of intention to use condoms

	EU ^a	U ^b	L ^c	EL ^d	F
	N = 296	N = 72	N = 43	N = 175	
	M(SD)	M(SD)	M(SD)	M(SD)	
Self-efficacy	4.32 (1.61)	4.74 (1.13)	4.89 (0.81)	5.51 (0.87)	29.87***
Outcome expectancy	2.41 (1.43)	3.26 (1.45)	3.79 (1.38)	4.48 (1.58)	75.29***
Normative expectations	2.57 (1.31)	3.40 (1.22)	3.83 (1.08)	3.98 (1.41)	46.82***
Refusal (categorical)	2.44 (2.01)	3.04 (1.83)	2.91 (1.96)	2.72 (2.12)	15.05*** ^e

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ ^a EU = extremely unlikely, ^b U = unlikely, ^c L = likely, ^d EL = extremely likely, ^e Kruskal-Wallis chi-square.

Table 3. Logistic regression of demographic and theory of planned behaviour variables on intention to use condoms

Variable	EU vs U,L,EL ^a		U vs L,EL ^a		L vs EL ^a	
	OR ^b	95%CI ^c	OR ^b	95%CI ^c	OR ^b	95%CI ^c
Age	1.02*	1.00–1.05	1.05**	1.01–1.09	NS	
Child in home	NS ^d		NS		NS	
Frequency of crack use	n.s		NS		NS	
Self-efficacy	1.26**	1.06–1.49	NS		1.69**	1.13–2.52
Outcome expectancy	1.68***	1.46–1.93	1.63***	1.31–2.03	NS	
Normative beliefs	1.62***	1.39–1.90	NS		NS	
Refusal					NS	
Unpleasant	1.20	0.69–2.06	1.80	0.72–4.45	NS	
Pleasant	1.87*	1.01–3.43	0.43	0.18–1.04	NS	
Extremely pleasant	0.67	0.30–1.45	0.25**	0.08–0.76	NS	
Hosmer-Lemshow goodness of fit						
Chi-square		7.07		3.60		6.02

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ^a EU = extremely unlikely, U = unlikely, L = likely, EL = extremely likely, ^b odds ratio, ^c 95% confidence interval, ^d NS = not significant.

significant predictor of self-efficacy and condom pleasure. Dramatic relief was negatively related to self-efficacy. No process variables were related to the refusal to use condoms construct. Self-liberation predicted self-efficacy and condoms block romance.

Multivariate model of predictors of intention

Two structural equation models were developed using AMOS 3.61 for Windows (Arbuckle, 1997). The first model included all significant factors identified through the above analyses. In this model, the demographic variable, age, along with the four theory guided variables were used to predict intention. The two condom belief variables (condom romance and condom pleasure) were used to predict outcome expectancies. Finally, the five significant process variables (Table 4) were used to predict condom beliefs and condom use outcome expectancies, normative beliefs and self-efficacy. This complete model provided a moderate fit to the data with a $\chi^2(650, n = 226) = 1269.04, p < 0.00$, and a CMIN/df = 1.95. Although the chi-square discrepancy is significant, some authors suggest this is an inadequate measure of fit with applied data and other indices are more appropriate (Bentler, 1990; Steiger, 1990). CMIN/df value is within an acceptable range (Arbuckle, 1997). The goodness of fit index

Table 4. OLS multiple regression equation of condom beliefs on outcome expectancies for primary partners

	b ^a	B ^b
Condom romance	- 0.35	- 0.28***
Condom pleasure	0.32	0.25***
Condoms prevent illness	NS ^c	
Condoms are a problem	NS	
Condoms are bad	NS	
	R ² = 0.12	Adj R ² = 0.12 R = 0.35***

Note. $p < 0.05$, ** $p < 0.01$. *** $p < 0.001$. ^a unstandardized regression coefficient, ^b standardized regression coefficient, ^c NS = not significant.

Table 5. OLS regression equations of process of change variables on significant TPB and condom belief variables

Processes of change	Self-efficacy		Outcome expectancy		Normative beliefs		Condoms block romance		Condom pleasure	
	b ^a	B ^b	b ^a	B ^b	b ^a	B ^b	b ^a	B ^b	b	B
Behavioural control	NS ^c		0.27	0.25***	0.29	0.31***	0.29	0.30***	0.42	0.51***
Counter-conditioning	NS		0.26	0.22***	NS		-0.24	-0.23***	NS	
Social liberation	0.19	0.16*		NS	NS		NS	NS	-0.17	-0.14*
Dramatic relief	-0.21	-0.18*		NS	NS		NS	NS	NS	NS
Self-liberation	0.47	0.28***		NS	NS		-0.34	-0.18*	NS	NS
Consciousness raising (AIDs)	NS			NS	NS		NS	NS	NS	NS
Consciousness raising (Condoms)	NS			NS	NS		NS	NS	NS	NS
R ²				0.16		0.12		0.14		0.28
Adj. R ²				0.13		0.09		0.11		0.26
R				0.40***		0.34***		0.37***		0.53***

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. ^a Unstandardized regression coefficient, ^b standardized regression coefficient, ^c NS = not significant.

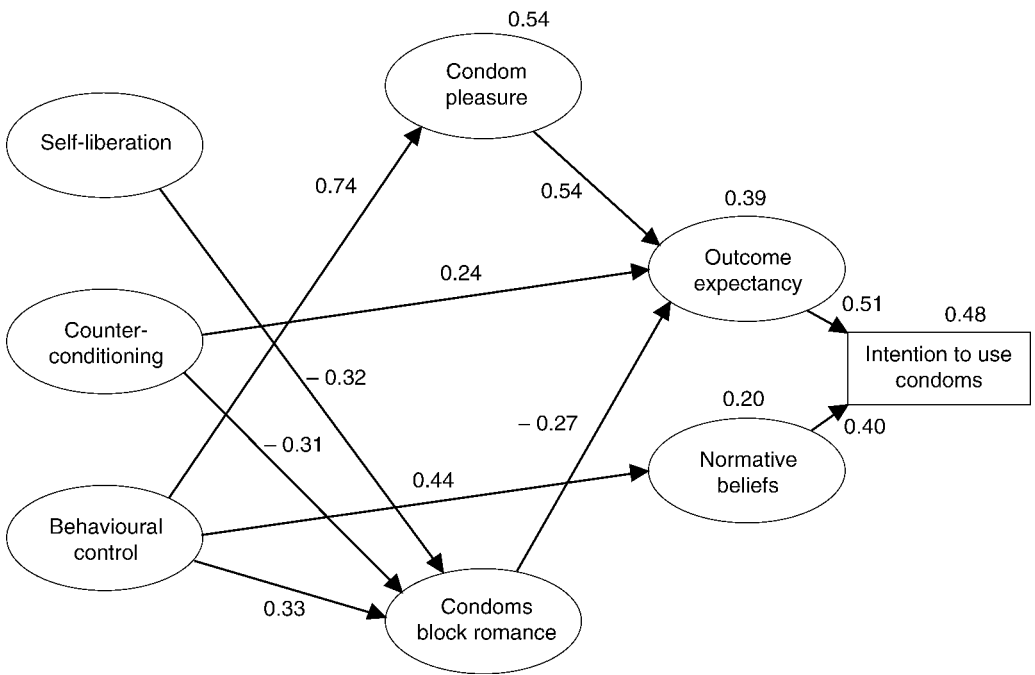


FIG. 1. Trimmed structural equation model identifying important targets and processes of change to increase condom use among not-in-treatment crack user and their loved partners.

(GFI; Joreskog & Sorbom, 1993) was 0.77, the comparative fit index (CFI; Bentler, 1990) was 0.73, which do not represent a strong fit, but the root mean square error of approximation (RMSEA; Steiger, 1990) was 0.06, which is acceptable.

The final model was developed by including only constructs with significant path coefficients and removal of the refusal to use condoms variable since no process variable was identified to change this belief. The final, multivariate model is shown in Figure 1 and includes standardized regression weights. The model chi-square was $\chi^2(267, n = 226) = 537.52, p < 0.00$, with $CMIN/df = 2.01$. The GFI increased to 0.85 and the CFI was 0.83. The RMSEA was 0.07 with a 90% confidence interval of 0.06 to 0.08. The chi-square difference test resulted in a significant difference between the models ($\chi^2(383, n = 226) = 731, p < 0.00$), suggesting that the second and more parsimonious model presents a better fit to the data.

Discussion

The purpose of this study was to develop a model for changing intention to use condoms with heterosexual crack cocaine smokers. The model includes both cognitive-behavioural determinants of intention and processes of change that might be used to change the determinants. The specification of these variables should improve the development of interventions to reduce HIV sexual risk behaviours among crack cocaine smokers. The scope of the analyses was limited to an investigation of condom use with primary sexual partners, as the prior elicitation study (Williams *et al.*, 2000) showed that condom use with primary partners was the most difficult for drug users to initiate and maintain.

Study measures were designed to assess variables identified by the theory of reasoned

action (Fishbein & Ajzen, 1975), theory of planned behavior (Ajzen, 1991), and stages of change (Prochaska *et al.*, 1992). The elicitation study (Williams *et al.*, 2000) provided the framework for questions that would assess these constructs among crack cocaine smokers. Principal components factor analysis revealed the expected primary determinants for condom use intention—normative beliefs, self-efficacy and outcome expectancies—plus a fourth factor, refusal to have sex without a condom. Univariate and logistic regression analyses showed that the four measures were significantly related to intention to use condoms with primary partners. Structural equation modeling indicated that normative beliefs and outcome expectancies had the strongest relationship to intention, while self-efficacy and refusal were not significant. Ratings of condom use self-efficacy were very high, suggesting that its lack of predictive power for intention may be due to a ceiling effect with this sample. Alternatively, self-efficacy may be more strongly related to actual behaviour, than to behavioural intention (Bandura, 1994). A third possibility is that different types of self-efficacy (e.g. pleasure self-efficacy) need to be assessed. The refusal measure, on the other hand, may simply be an anomaly of this data, or a distinct predictor of drug users' condom use.

Normative beliefs had the strongest direct relationship with these drug users' intention to use condoms. This suggests that development of a group intervention, in which peers or couples compose the groups, would be an important component for increasing normative beliefs. Williams *et al.* (2000) found that introducing condom use between primary partners would be extremely difficult, suggesting that a couples intervention might be especially useful. This finding is consistent with results of surveys of the American population (Anderson *et al.*, 1999a; 1999b). The primary therapy process found to affect normative beliefs was the behavioural control factor. This factor includes both stimulus control and reinforcement. A couples or group intervention would provide peer reinforcement for talking about condoms, and attempts to use condoms. Having couples develop a condom use plan, discuss specific steps to implement the plan and discuss efforts to carry out the plan should make the partner a stimulus or reminder for condom use. These findings support the notion that providing couples with a safe environment in which to discuss condom use should be an effective strategy for increasing condom use among drug-using couples (Padian *et al.*, 1998).

Outcome expectancies were the second variable that contributed to intention. More specifically, two condom beliefs (condoms block romance and condom pleasure) were strongly related to outcome expectancies. The condom beliefs related to disease prevention and the negative functional aspects of condom use did not affect outcome expectancies. In addition, negative interpersonal aspects of condom use, such as fears of physical abuse for insisting on condom use or unsatisfying sexual relationships, were also unrelated. These findings suggest that interventions should focus on strategies that increase positive outcome expectancies, including ways to use condoms within a romantic context and emphasizing pleasurable ways to incorporate condoms into sexual activities.

Two behavioural processes were directly related to condom beliefs and outcome expectancies. Counter-conditioning, or the ability to do something other than penetrative sex when no condom was available, affected outcome expectancies directly and indirectly by reducing the belief that condoms block romance. The final and possibly the most important process, behavioural control, includes both antecedent and consequent control of the participant's behaviours. Participants who reported keeping reminders to use condoms and reinforcing themselves for condom use reported very high pleasure from condom use and direct effects on their normative beliefs. This suggests that risk reduction interventions targeting drug users should develop condom use reminders, as well as provide strong reinforcers for pleasurable condom use and romantic ways to use condoms. Visible reminders to use condoms should allow partners to be aware of condom use with primary partners as a positive norm, rather

than an implication of infidelity, thus increasing pleasure and subsequently changing outcome expectancies. In addition, rewarding one's self for condom use should increase the positive association between condom use and the contextual stimuli for sex with condoms. Reward from others for condom use, particularly from the primary partner, should also increase the positive association between contextual cues for condom use.

Social liberation and dramatic relief predicted self-efficacy only, and were eliminated in the final model. It is interesting to note that dramatic relief, which relates to increased emotional reactions to thoughts about AIDS and condom use, reduced feelings of self-efficacy. This finding supports recent reports that strong emotional responses to HIV/AIDS may result in a cognitive escape response and riskier sexual behaviours (McKirnan *et al.*, 1996; Williams *et al.*, in press). Self-liberation, or the participant's belief that condom use is socially accepted and under his/her control, was also positively related to self-efficacy and negatively related to condom romance. This suggests that interventions that encourage drug users to talk with others in positive ways about using condoms should increase their personal beliefs in their ability to use condoms as well as increase their ability to reduce barriers to romantic condom use.

Conclusions

In summary, a group intervention in which drug users are given a means to remind themselves to use condoms and reward themselves for condom use within specific romantic contexts should improve intention to use condoms and increase condom use. During the intervention, participants might be given an opportunity to develop romantic plans to use condoms with their primary partners. Group discussion about pleasurable condom use with primary partners would provide reminders to try a romantic activity with condoms. The group would also provide a safe forum in which the success or failure of the condom use plan could be discussed. Discussions of condom use between partners should focus on successful condom use and support efforts to reduce barriers to condom use. Ideally, a number of sessions would be developed to provide repeated encounters with peers and chances to develop and refine plans for romantic condom use.

Although this study provides a quantitative approach to intervention design, it has a number of limitations. The assessment of theory driven constructs was developed specifically for this study. This approach limits the traditional psychometric properties of the questionnaire, but provides a more idiographic assessment for this drug-using sample. Additional research using the condom beliefs and processes of change should address the low alpha scores for some of these constructs. Finally, to increase the validity of the predictive model, a longitudinal study using the variables identified and/or an intervention study should be implemented.

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