

## HIV Risk in Intravenous Drug Users and Crack Cocaine Smokers: Predicting Stage of Change for Condom Use

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This study examined the utility of the Transtheoretical Model of Change and the AIDS Risk Reduction Model for predicting condom use with not-in-treatment crack cocaine smokers and intravenous drug users. The sample included 265 participants; 99 reported having casual partners and 166 reported having main partners. All participants must have used drugs in the preceding 48 hr and received no drug treatment for at least 1 year. Participants were grouped into 3 stages of change; precontemplation, contemplation, and action. Logistic regression analyses indicated that both the benefits of change and condom assertiveness varied across the stages of change for main and casual partners, whereas the costs of change were important for predicting stage only with main partners. Age was a significant predictor of stage with casual partners, whereas ethnicity and nonherpes sexually transmitted diseases significantly predicted stage with main partners. The utility of the stages of change for choosing intervention strategies and the need for more qualitative and longitudinal research to determine additional predictors of intention to use condoms are discussed.

Approximately 250,000 people have been diagnosed with AIDS in the United States, where it is the second leading cause of death in men and the sixth in women (Centers for Disease Control, [CDC], 1993). Intravenous drug users are the group with the second highest prevalence rate of HIV, including approximately 21% of male and 49% of female cases (CDC, 1993). Forty percent of HIV-infected Hispanic women have acquired the disease through heterosexual transmission, compared with 33% of White and 36% of African American women (CDC, 1993). Heterosexual transmission from drug users (especially crack cocaine smokers) to non-drug users has been identified as a major area of concern for containing the HIV epidemic (Mathias, 1993), with 71.7% of women contracting HIV from heterosexual contact with intravenous drug users (Choi & Wermuth, 1991).

The literature supports a strong link between drug use and risky sexual behavior. Intravenous drug users are at greater risk through sharing of unsterilized needles, increased numbers of sexual partners, unprotected sex, and having an injection drug user as a sexual partner (Schoenbaum, Hartel, & Friedland, 1990). Noninjecting users of crack cocaine are at increased risk

because of high numbers of sexual partners, trading sex for drugs, and having injection-drug-using partners (Weissman, Souder, & Young, 1990). There is some evidence that addicts have reduced their use of unsterile needles (Chitwood, McCoy, & Comerfield, 1990; Des Jarlais, Friedman, & Hopkins, 1985; Guydish, Golden, & Hembry, 1991), although resisting efforts to reduce risky sexual behavior (Sorensen, 1990). Chitwood et al. (1990) reported that although 91.0% of intravenous cocaine and opiate users were sexually active, 70% never used condoms and only 10% used them at least 50% of the time. In addition, in a sample of 149 male injectors with stable partners, 83% reported two or more partners in the last 5 years (Lewis, Watters, & Case, 1990).

One behavior that is thought to be effective in preventing the spread of the virus during sexual activity is condom use (Reiss & Leik, 1989), but the size of the effect is currently in dispute (Weller, 1993). Although some high-risk groups (e.g., gay men) initially increased their condom use, there is increasing evidence that there has been relapse to high-risk sexual behavior (Ekstrand & Coates, 1990; Stall & Ekstrand, 1989). In Hispanic groups, married women seldom use condoms (Mosher & Bachrach, 1988), and little is known about unmarried women. In one study, with 522 Hispanic adults (B. V. Marin & G. Marin, 1992), only one third of high-risk men reported "always" using condoms with all partners and reported greater frequency of risky behavior than women. In addition, both men and women reported being embarrassed to buy condoms, and women were often embarrassed to ask their partner to use condoms. The low rate of condom use among African Americans and other minorities may be related to lower perceived risk for HIV infection (Kalichman, Hunter, & Kelly, 1992; G. Marin, 1989). These cultural differences suggest that, to improve adoption and maintenance of condom use, assessment of specific behaviors and attitudes toward condoms across cultural groups is an important step in improving condom use.

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A person's intention to change has been shown to be a good predictor of health behavior change (Fishbein & Azjen, 1975). However, many studies assess change as a dichotomous process and assume an immediate transition from intent to change to maintenance. For example, treatment outcome is often defined as "the client used condoms all the time or did not." The change process, however, is seldom dichotomous and may be preceded by changes in attitudes and cognitions (Catania, Kegeles, & Coaters, 1990; Prochaska, Redding, Harlow, Rossi, & Velicer, 1994). Additionally, even when overt behavior change is attained, it is seldom maintained on the first attempt and multiple relapses are common (Prochaska, DiClemente, & Norcross, 1992). Smokers, for instance, typically make three to four attempts to quit before successfully maintaining the change (Prochaska et al., 1992).

One model, developed specifically to examine the process of sexual risk reduction is the AIDS Risk Reduction Model (ARRM; Catania, Kegeles, et al., 1990). In this model, three stages have been proposed: labeling, commitment, and enactment. Before transition from labeling to commitment, a person at risk must acknowledge that the behavior he or she is engaging in is problematic. This may occur because of changes in knowledge, in perceived susceptibility, or in network norms. Once the person labels the behavior as problematic, then he or she moves to the commitment stage. Although a person may see the behavior as problematic, he or she may not be committed to change if the costs are too high, the benefits too low, or the person does not believe that he or she has the ability to make the change. Once the person is committed to change, the enactment stage begins. Behaviors thought to compose this stage include seeking more information about ways to change (i.e., self-help books), obtaining necessary remedies (e.g., condoms), and enacting solutions.

A second theoretical framework for conceptualizing change as a process is the Transtheoretical Model of Change (TMC; Prochaska & DiClemente, 1983, 1986; Prochaska et al., 1992). In this model, the process of change is typically divided into five stages: precontemplation, contemplation, preparing for action, action, and maintenance. The five stages provide a handy approach to examining smaller increments of intention to change and have been shown to be useful in predicting change in smoking cessation, progress in therapy, weight loss, stress management, exercise adoption, and condom use (e.g., DiClemente et al., 1991; Prochaska & DiClemente, 1985; Prochaska et al., 1990). Variables found to vary across the stages include the importance of the advantages (pros) and disadvantages (cons) and perceived self-efficacy for change (Prochaska et al., 1992).

The TMC model has been applied, in one study, to the adoption of condom use with a high-HIV-risk sample. (Prochaska et al., 1990). The participants' risk behaviors included anal intercourse, exchanging sex for payment, and intravenous drug use. Only 18% reported that they always used condoms. The goals of the study included determining the efficacy of the TMC model for adopting condom use, development of the decisional balance and confidence questionnaires, and examination of whether condom use was a unitary or multidimensional phenomenon. The study included extensive validation of the questionnaires and resulted in a

five-question staging algorithm as well as questions for examining the importance of the pros and cons and perceived self-efficacy for change. These findings support the use of the TMC for condom use in high-risk populations.

There are similarities between these two models in the proposed stages, as well as cognitive and behavioral changes that occur across the stages. The labeling stage of the ARRM is very similar to the precontemplation stage of the TMC. Specifically, the person does not see his or her behavior as problematic, and the importance of pros of changing are low, whereas the cons are high. To make a transition from labeling to commitment or from precontemplation to contemplation-preparing for action (i.e., thinking about changing), some environmental event is thought to occur, such as a change in social norms that may result in environmental re-evaluation or an event that causes the person to learn something about the disease that increases his or her anxiety and awareness of its effects. During the commitment stage of the ARRM, the person is thought to evaluate the pros and cons of change and develop self-efficacy around his or her ability to make change. Similarly, participants in the contemplation-preparing for action stages of the TMC have been shown to rate the pros of change more highly than the cons. In addition, self-efficacy is higher during these stages and continues to increase for participants in the action stage. Finally, the enactment stage of the ARRM and the action-maintenance stages of the TMC represent times when the person is actively trying to change his or her behavior and maintain the change. The ARRM proposes that high communication skills are especially important and that the person may engage in a variety of self-help behaviors, including seeking advice from friends. Similarly, studies using the TMC as an organizing strategy have found that helping relationships are used during these stages, along with behavioral processes such as stimulus control and reinforcement.

The present study was designed to expand the applicability of stage models to the reduction of HIV-risk behaviors. Specifically, using the staging algorithm of Prochaska et al. (1990), not-in-treatment crack smokers and intravenous drug-using participants were distributed across three levels of intention to change. These levels included precontemplation, contemplation-preparing for action, and an action-maintenance group, similar to the labeling, commitment, and enactment stages of the ARRM. Variations in prevalence of risky sexual behavior and drug use were examined across these stages. Finally, the relationship between the three stages, ethnic (African Americans, Whites, and Hispanics) and gender representation, nonherpes sexually transmitted diseases (STDs), perceived chance of contracting HIV, the importance of the pros and cons of change, and self-efficacy were examined using three logistic regressions for main and three logistic regressions for casual partners.

## Method

### *Participants*

The 205 sexually active respondents were given the stages-of-change questionnaires, in English; 99 reported having sexual intercourse with

casual partners, and 166, with main partners. Sixty participants reported both having main and casual sex partners. All participants were either intravenous drug users (IDUs) or crack smokers (NIDUs) and had not been in drug treatment for at least 30 days. All were participating in a rural AIDS prevention project and were recruited through indigenous outreach workers. They were recruited from a rural community of approximately 45,000 people in the southwestern United States.

### Measures

*Risk behavior assessment (RBA).* This is a comprehensive assessment of drug use, sexual behavior, and the influence of drug use on sexual behaviors that place the participant at risk for contracting HIV. The questions are posed in the open-response format (Catania, Gibson, Chitwood, & Coates, 1990). Data from the RBA used in this article include demographic variables, sexual risk variables, and drug use variables.

Unique and composite variables were used. The unique variable was a rating of perceived chance (0%, 25%, 50%, 75%, or 100%) of contracting HIV. Composite variables included (a) sum of episodes of nonherpes STDs, (b) the frequency of sex with nonintravenous drug users (NIDU-SI), (c) the frequency of unprotected sex ("unsafe sex" index; USI), (d) frequency of use of intravenous drugs within a 30-day period (FUID) and (e) frequency of use of nonintravenous drugs within a 30-day period (FUNID). The frequency of nonherpes STDs was found by adding the total number of episodes of each of the following STDs: syphilis, gonorrhea, hepatitis B, genital warts, and chlamydia. This variable was recoded into a categorical variable in the following way: 0 = no STDs, 1 = one episode, and 2 = more than one type or more than one episode of the same STD.

The NIDU-SI was developed by calculating the percentage of times within the previous 30 days each participant had sexual intercourse with someone who was not an IDU. This was recoded into four categories: 0 = never, 1 = <50%, 2 = 51–99%, and 3 = 100%. The unsafe sex index was calculated by finding the percentage of times in the past 30 days the person had intercourse without using a condom. This was recoded into a categorical variable in the following way: 0 = never used a condom, 1 = some condom use (1–99%), and 2 = 100% condom use.

The two measures of drug use were found by computing the sum of reported frequency of injection (FUID) or noninjection use (FUNID) of cocaine, heroin, methadone, other opiates, and amphetamines during the past 30 days. Both variables were recoded into categorical variables in the following way: 0 = no use, 1 = 1–10 uses in the past 30 days, 2 = 11 to 30 uses in the past 30 days, 3 = 31 to 60 uses, 4 = 61 to 90 uses, and 5 = more than 90 uses in the past 30 days.

*Stages of change: Vaginal intercourse (main partner and casual partner).* Two questionnaires (main or casual partner) for vaginal intercourse were used to assess stage of condom use, pros, cons, and assertiveness. Stages, pros, cons, and assertiveness were adapted from the questionnaires that were developed and validated by Prochaska et al. (1990). A four-question algorithm was used to ascertain stage of change and included the following questions: (a) Do you use a condom every time you have vaginal intercourse? (b) How long have you been using a condom every time you have vaginal intercourse? (c) Do you plan to start using a condom every time you have vaginal intercourse within the next 30 days? and (d) Do you plan to start using a condom every time you have vaginal intercourse within the next 6 months? The operational definitions for the stages are shown in Table 1.

The six decisional balance questions (3 pros and 3 cons) were rated on a 5-point Likert scale for how much they affected the person's decision to use a condom (1 = *not at all* to 5 = *extremely*). Mean pro and mean con scores were calculated by averaging across the three questions. The reliability coefficients for the four scales are as follows: casual

Table 1  
*Operational Definitions for Stages of Change and Scoring the Staging Algorithm*

Stage of change	Operational definition
Precontemplation	No intention to start using condoms in the next 6 months.
Contemplation	Participant states that he or she plans to start using condoms in the next 6 months, but not the next 30 days.
Preparing for action	Participant intends to start using condoms in the next 30 days.
Action	Participant reports always using condoms, but has done so for less than 6 months.
Maintenance	Participant reports always using condoms for more than 6 months.

pros, .96; casual cons, .96; main pros, .94; and main cons, .91 (questions and additional scale properties can be seen in Table 2).

Sexual assertiveness was determined by calculating the mean score of ratings on three questions that ask the participants to rate how frequently he or she would engage in a specific behavior with a 5-point Likert scale (1 = *always* to 5 = *never*). A typical question would be, "How often do you discuss the use of condoms with your main partner?" Cronbach's alphas for the two scales are as follows: casual assertiveness, .96, and main assertiveness, .76 (questions and additional scale properties can be seen in Table 2).

### Procedure

The data for this study were collected as part of the National Institute on Drug Abuse Cooperative Agreement Project. This is a national monitoring and intervention project that includes 22 cities. All data used in this article were collected from the single community described earlier.

Participants were recruited by indigenous outreach workers using a targeted sampling plan. Before data collection, informed consent was obtained and drug use status was established using either evidence of fresh needle tracks or the ONTRAK Rapid Assay for Drug Use (Roche Diagnostic Systems, Nutley, NJ). The RBA and Stages questionnaires were read to the participant and answers were entered by a trained interviewer. Intervention and anonymous HIV testing were offered subsequent to data collection. All participants were paid \$15 for providing data. This project has been approved by the Northern Arizona University Institutional Review Board.

Data were analyzed using either SPSS (Statistical Package for the Social Sciences) for Windows, Version 6.0, or BMDP Statistical Software. The cross-tabulation tables for stage of change across ethnic groups, gender, drug use, and age were analyzed for distribution differences, using the Pearson chi-square, with  $p < .05$  considered to be significant. Six stepwise logistic regression analyses (three for casual partner and three for main partner) were used to examine the contribution of gender, age, ethnicity, pros and cons of change, assertiveness, perceived chance of contracting HIV, and nonherpes STDs to the self-identified stage of change. Given the small sample sizes, the Hosmer-Lemeshow goodness of fit test was used to determine the adequacy of the fitted models.

## Results

### Partner Type (Main Versus Casual)

The operational definitions used to develop the staging algorithm results in five stages of change: precontemplation, con-

Table 2  
*Questions and Scale Characteristics for Pros, Cons, and Assertiveness for Condom Use*

Question	Item-total correlation		Item				Scale			
	Main	Casual	Main		Casual		Main		Casual	
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Assertiveness</b>										
How often do you refuse to have vaginal intercourse with a casual/main partner when you don't have a condom?	.70	.92	4.50	1.80	4.34	2.59				
How often do you insist upon condom use with a casual/main partner when having vaginal intercourse?	.56	.95	4.61	2.88	4.07	2.72	13.28	5.53	12.60	7.65
How often do you discuss the use of condoms with your casual/main partner?	.64	.87	4.16	1.86	4.19	2.67				
<b>How much do each of these affect your decision to use or not use a condom?</b>										
<b>Pros</b>										
I would feel more responsible.	.86	.91	3.58	2.26	4.82	2.39				
I would feel safer.	.90	.91	3.81	2.19	5.10	2.16	10.97	6.34	14.87	6.58
My partner would feel safer.	.87	.92	3.58	2.26	4.95	2.30				
<b>Cons</b>										
It would be too much trouble.	.81	.91	2.46	2.30	3.24	2.94				
It would make me feel unnatural.	.82	.90	2.93	2.30	3.64	2.96	7.99	6.38	10.02	8.38
My partner would be angry.	.81	.92	2.60	2.34	3.13	2.93				

templation, preparing for action, action, and maintenance. Of the 166 participants reporting a main partner, 49% ( $n = 81$ ) were in precontemplation, 8% ( $n = 13$ ) were in the contemplation stage, 31% ( $n = 52$ ) were in the preparing for action stage, 4% ( $n = 6$ ) in action, and 8% ( $n = 14$ ) in maintenance. Ninety-nine participants reported having casual partners in the last 6 months, with 22% ( $n = 22$ ) in precontemplation, 4% ( $n = 4$ ) in contemplation, 38% ( $n = 38$ ) in preparation for action, 9% ( $n = 9$ ) in action, and 26% ( $n = 26$ ) in maintenance. Given the low numbers of participants in the contemplation and action stages, the stages were reduced to three in the following manner. The precontemplation stage remained the same, because none of the participants were using condoms and they did not intend to start in the next 6 months. The contemplation and preparing-for-action stages were combined and labeled contemplation. The rationale for this combination was that all of these participants were thinking about starting to use condoms in the next 6 months. The difference is that a small number of these thought they might start in the next 30 days. Finally, the action and maintenance stages were combined and labeled action, because both groups were actively using condoms. The difference between the two was the duration of condom use. People in action have been using condoms consistently for less than 6 months, whereas the maintenance group had been doing so longer than 6 months. The distribution of participants across the combined stages by age, gender, ethnicity, and type of drug use by partner type is shown in Table 3.

*Participants with casual partners.* The 99 participants in-

cluded 27% ( $n = 27$ ) women and 73% ( $n = 72$ ) men, with no significant differences across the stages in the distribution of men and women,  $\chi^2(2, N = 99) = 1.35, p = .51$ . The participants ranged in age from 18 to older than 45 years, with 57% ( $n = 56$ ) between 18 and 24 years, 28% ( $n = 28$ ) between 25 and 34 years, 12% ( $n = 12$ ) between 35 and 44, and 3% ( $n = 3$ ) older than 44. The distribution of participants across the stages was significantly different, with the younger participants tending to report more condom use than older participants,  $\chi^2(6, N = 99) = 21.50, p = .001$ . The ethnic composition of the sample included 17% ( $n = 17$ ) African Americans, 44% ( $n = 44$ ) Whites, and 38% ( $n = 38$ ) Hispanics, with no significant difference across the stages,  $\chi^2(4, N = 99) = 1.42, p = .84$ . The drug use status included 46% ( $n = 46$ ) intravenous drug users and 54% ( $n = 53$ ) cocaine smokers.

*Participants with main partners.* The 166 participants with main partners included 38% ( $n = 63$ ) women and 62% ( $n = 103$ ) men, with no significant difference across the stages,  $\chi^2(2, N = 166) = 2.01, p = .36$ . These participants ranged in age from 18 to older than 44 years, with 42% ( $n = 68$ ) between 18 and 24 years, 38% ( $n = 61$ ) between 25 and 34 years, 16% ( $n = 26$ ) between 35 and 44 years, and 6% ( $n = 9$ ) older than 44 years. The distribution of participants across age group and stage was significantly different with a tendency for more of the younger participants to use condoms more,  $\chi^2(6, N = 106) = 13.72, p = .03$ . The ethnic composition of the sample was 25% ( $n = 41$ ) African American, 40% ( $n = 67$ ) White, and 35% ( $n = 58$ ) Hispanic, with a tendency for fewer Whites to be in contemplation than the other two groups,

Table 3  
Distribution of Participants by Age, Gender, and Ethnicity by Partner Type

Stage	Main partner (n = 166)				Casual partner (n = 99)			
	P (%)	C (%)	A (%)	$\chi^2$	P (%)	C (%)	A (%)	$\chi^2$
Age (years)				13.7*				21.5**
18–24	14.6	18.3	8.5		6.1	24.2	26.3	
25–34	20.1	14.6	2.4		7.1	13.1	8.1	
35–44	11.0	4.3	0.6		8.1	3.0	1.0	
≥45	3.0	1.8	0.6		1.0	2.0	0.0	
Gender				2.0				1.4
Male	28.3	24.7	9.0		17.2	28.3	27.3	
Female	20.5	14.5	3.0		5.1	14.1	8.1	
Ethnicity				9.8*				1.4
Black	11.4	11.4	1.8		4.0	8.1	5.1	
White	24.1	10.2	17.5		11.1	16.2	17.2	
Hispanic	13.3	17.5	4.2		7.1	18.2	13.1	
Drug use				5.2				1.8
IDU	24.1	12.0	5.4		13.1	18.2	15.2	
NIDU	24.7	27.1	6.6		9.1	24.2	20.2	

Note. P = precontemplation stage; C = contemplation–preparation stage; A = action stage; IDU = intravenous drug use; NIDU = nonintravenous drug use.

\* $p < .05$ . \*\* $p < .01$ .

$\chi^2(4, N = 106) = 9.84, p = .04$ . The drug use pattern included 42% ( $n = 69$ ) intravenous drug users and 58% ( $n = 97$ ) crack smokers, with similar distributions across the stages of change,  $\chi^2(2, N = 106) = 5.25, p = .07$ .

#### Distribution of Sex and Drug Variables Across the Stages

Tables 4 and 5 show the distribution, chi-square, and significance levels for the participants' perceived chance of contracting HIV, for the composite sex-related variables, and for the drug variables across the three stages of change for condom use for main and casual partners.

*Perceived chance of contracting HIV.* The distribution of participants across perceived chance of contracting HIV was very similar for participants with main and casual partners. The majority (57% with main partners and 58% with casual partners) felt that they had a 25% chance of contracting HIV. The participants who felt they had no chance of contracting HIV were 14% of those with casual partners and 17% of those with main partners. A total of 20% of the participants with casual partners and 18% with main partners felt they had a 50% chance of contracting HIV. Only 7% of participants with casual partners and 8% with main partners felt they had 75% to 100%. Only 3% of participants with main partners and only 1% with casual partners felt they had 100% chance of catching the virus. Chi-square analyses indicated that there were no significant differences in the distributions across stage for either main,  $\chi^2(8, N = 166) = 7.57, p = .47$ , or casual partner,  $\chi^2(8, N = 98) = 11.15, p = .19$ .

*Nonherpes sexually transmitted diseases.* The majority of participants (72% with casual partners and 69% with main partners) reported no episodes of STDs. The remaining participants with casual partners were approximately equally distrib-

uted across one and more than one episode of an STD (13% and 15%, respectively). There was also a similar distribution for participants with main partners, with 16% reporting one episode and 15% reporting more than one. The chi-square for stage of change for casual partners across episodes of STDs was not significant,  $\chi^2(4, N = 99) = 5.55, p = .24$ , whereas the chi-square for main partner was significantly different,  $\chi^2(4, N = 166) = 5.25, p = .04$ .

*Sexual behaviors.* The frequency of participants across the stages for the NIDU-SI did not show any significant differences for casual partners,  $\chi^2(4, N = 87) = 3.90, p = .42$ , or for main partners,  $\chi^2(4, N = 153) = 5.32, p = .26$ . There were significant differences in the distribution of participants across the stages of change for frequency of unprotected sex (USI) for both casual,  $\chi^2(6, N = 97) = 31.57, p = .000$ , and main partner,  $\chi^2(6, N = 164) = 48.78, p = .000$ . In general, for participants with both main and casual partners who reported no unprotected sex, a higher percentage were in the action–maintenance stage (43% and 58%, respectively) and for those reporting 100% unprotected sex, a higher percentage were in the precontemplation stage (58% and 42%, respectively).

*Frequency of drug use, past 30 days.* There were no significant differences in the distributions for amount of nonintravenous drug use across the stages for participants with casual,  $\chi^2(10, N = 97) = 6.51, p = .77$ , or main partners,  $\chi^2(10, N = 162) = 8.80, p = .55$  (see Table 5). There were also no significant differences in the distribution across the stages of change for intravenous drug use for participants with casual,  $\chi^2(8, N = 99) = 7.45, p = .49$ , or main partners,  $\chi^2(10, N = 166) = 11.25, p = .34$ .

#### Predicting the Stages of Change

Logistic regression analyses were performed using the three cognitive variables (pros, cons, and assertiveness), three demo-

Table 4  
 Percentage of Participants and Chi-Squares for Sex Variables and Perceived Susceptibility to HIV Infection Across the Stages of Change for Main and Casual Partners

Variable	Main partner					Casual partner				
	P	C	A	n	$\chi^2$	P	C	A	n	$\chi^2$
Perceived chance of contracting HIV				166	7.57				98	11.16
0%	9.0	4.2	3.6			2.0	5.1	7.1		
25%	27.1	22.9	7.2			10.2	24.5	23.5		
50%	9.0	7.8	1.2			8.2	10.2	2.0		
75%	1.8	3.0	0			1.0	3.1	2.0		
100%	1.8	1.2	0			0	0	1.0		
Nonherpes sexually transmitted diseases (no. of episodes)				166	10.26*				99	5.55
Never	29.5	29.5	10.2			12.1	30.3	29.3		
Once	10.8	3.0	1.8			5.1	5.1	3.0		
>1	8.4	6.6	0			5.1	7.1	3.0		
Unsafe sex index (% condom use)				164	48.78***				97	31.57***
100%	7.3	5.5	9.8			4.1	11.3	21.6		
50-99%	2.4	4.3	1.2			0	6.2	8.2		
1-49%	2.4	3.7	0.6			0	5.2	2.1		
0%	36.6	25.6	0.6			17.5	19.6	4.1		

Note. P = precontemplation stage; C = contemplation-preparation stage; A = action-maintenance stage.  
 \*  $p < .05$ . \*\*\*  $p < .001$ .

graphic variables (age, gender, and ethnicity), episodes of nonherpes STDs, and perceived chance of HIV infection as independent variables. The trichotomous dependent variable (stage of change) was dichotomized, and six stepwise logistic regressions were performed (three casual and three main).

**Main partner.** Examination of the Hosmer-Lemshow goodness of fit chi-square for the three logistic regressions for main partner (see Table 6) suggests that the fit of the models is adequate. The variables in the equation for the action stage provided the strongest fit,  $\chi^2(8, N = 161) = 4.29, p = .83$ , with the contemplation equation next strongest,  $\chi^2(8, N = 161) = 6.76, p = .56$ , and the precontemplation equation the weakest,  $\chi^2(8, N = 161) = 11.10, p = .20$ . In the precontemplation equation, the pros and assertiveness were significant predictors of inclusion in this stage, with the cons providing additional improvement in the overall goodness of fit chi-square. Specifically, the less important the pros of condom use (odds ratio = 0.32; 95% confidence interval [CI] = 0.22, 0.46), the less assertive the client (odds ratio = 0.48; 95% CI = 0.27, 0.86), and the more important the cons (odds ratio = 1.47; 95% CI = 0.97, 2.22), the more likely the participant was to be in this stage.

The second logistic regression indicated that the pros were the strongest predictor with an odds ratio of 2.46 (95% CI = 1.74, 3.49). Assertiveness was also a significant but less important predictor than in the first regression, with less assertive participants continuing to be more likely to be in this group (odds ratio = 0.63; 95% CI = 0.43, 0.93). Ethnicity and nonherpes STDs were also included in the equation. African Americans were more likely to be in this group than White participants (odds ratio = 0.36; 95% CI = 0.13, 0.96) and less likely than Hispanic participants (odds ratio = 1.22; 95% CI = 0.45, 3.31).

One episode of nonherpes STDs decreased the likelihood of inclusion in this group (odds ratio = 0.25; 95% CI = 0.71, 0.90), whereas multiple episodes increased the likelihood (odds ratio = 1.47; 95% CI = 0.47, 4.59).

In the action stage, assertiveness (odds ratio = 4.99; 95% CI = 2.07, 12.00), the pros of condom use (odds ratio = 2.91; 95% CI = 0.92, 9.26), and the cons of condom use (odds ratio = 0.35; 95% CI = 0.87, 1.40) were significant predictors of inclusion. Participants who were the most assertive, strongly endorsed the importance of the pros and placed low importance of the cons fall in this group. Ethnicity also contributed to inclusion in this group with Whites more likely than African Americans to be included (odds ratio = 5.50; 95% CI = 0.71, 42.50) and Hispanics less likely than African Americans (odds ratio = 0.98; 95% CI = 0.13, 7.60).

**Casual partners.** A summary of the results of the logistic regression for casual partners can be seen in Table 7. The three logistic regressions adequately fit the linear model. The precontemplation and action equations showed similar level of fit on the Hosmer-Lemshow goodness of fit chi-square,  $\chi^2(8, N = 98) = 7.20, p = .52$ , and  $\chi^2(8, N = 98) = 7.27, p = .51$ , respectively. The contemplation equation was the least well fit,  $\chi^2(8, N = 98) = 11.64, p = .17$ . The precontemplation regression equation included the pros (odds ratio = 0.27; 95% CI = 0.15, 0.47) and age (odds ratio = 1.08; 95% CI = 1.00, 1.16). The less important the pros and the older the participant, the more likely he or she was to be in this group.

The second logistic regression (contemplation) included assertiveness (odds ratio = 0.29; 95% CI = 0.16, 0.51), and the pros (odds ratio = 2.42; 95% CI = 1.45, 4.03). Participants who rated the pros more strongly yet were less assertive were in this

Table 5  
*Percentage of Participants and Chi-Square for Frequency of Drug Use by Intravenous or Nonintravenous Drug Use Across the Stages of Change for Main and Casual Partners*

Drug use	Main partner					Casual partner				
	P	C	A	n	$\chi^2$	P	C	A	n	$\chi^2$
Intravenous drug users				166	11.25				99	7.45
0	25.3	26.5	6.6			10.1	26.3	19.2		
1-10	9.6	6.6	3.0			8.1	6.1	11.1		
11-30	6.0	3.0	1.2			1.0	6.1	3.0		
31-60	6.0	0.6	1.2			2.0	3.0	2.0		
61-90	1.2	0.6	0.0			1.0	1.0	0.0		
>90	0.6	1.8	0.0			0.0	0.0	0.0		
Nonintravenous drug users				162	8.80				97	6.51
0	0.6	1.2	0.0			0.0	1.0	1.0		
1-10	9.3	3.1	0.6			2.1	5.1	2.1		
11-30	10.5	10.5	3.7			3.1	6.2	5.2		
31-60	8.6	9.3	3.7			5.2	8.2	12.4		
61-90	5.6	4.9	0.6			6.2	5.2	5.2		
>90	14.8	9.9	3.1			6.2	16.2	9.2		
Nonintravenous drug using partners				153	5.32				87	3.90
0%	13.1	5.9	1.3			3.4	5.7	3.4		
1-99%	3.9	2.0	0.7			6.9	4.6	5.7		
100%	31.4	31.4	10.5			12.6	29.9	27.6		

Note. P = precontemplation stage; C = contemplation-preparation stage; A = action-maintenance stage.

group. Additionally, younger participants were more likely to be in this group (odds ratio = 0.93; 95% CI = 0.87, 0.99).

Finally, the logistic regression for prediction of membership in the action group included only the assertiveness variable (odds ratio = 6.21; 95% CI = 3.02, 12.8), with those reporting high assertiveness being more likely to be in this group.

## Discussion

### *Validity of the Stages of Change Questionnaire*

Prochaska et al. (1990) have performed extensive research in developing stage of change questionnaires for condom use across different types of intercourse and with different partners. In addition, they found that a four-question algorithm adequately staged an at-risk population, based on differences in the decisional balance and self-efficacy across the stages. In this study, we have used this algorithm with not-in-treatment intravenous drug users and crack smokers. The validity of this method of staging is supported by the finding that the importance of the pros of condom use and assertiveness increase significantly across the stages of change with both main and casual partners. There was also a significant decrease in the importance of the cons of condom use with main partners. Finally, the frequency of unprotected sex decreased significantly across the stages of change for subjects with casual and main partners.

The validity of stage of change approach to understanding condom use was also supported by self-report data on drug use and nonherpes STDs. It was hypothesized that drug-related variables should not differ across the stages of change. Indeed, the distribution of participants by rate of injection drug use, crack smoking, or numbers of intravenous drug-using partners

was not different across the stages of change, regardless of partner type. The distribution of participants across frequency of STDs and stages was significantly different for participants with main partners. There was an increased likelihood of participants to be contemplating condom use if they had multiple episodes of nonherpes STDs than if they had only one episode. The lack of increased intention to use condoms with more frequent episodes of STDs, for participants with casual partners, may reflect differential concern for main partners versus casual partners. Because 60 participants reported both main and casual partners, it may be that these participants are considering condom use with their main partners to decrease the risk of their main partner's discovering the additional partners. The low rate of STDs in the population and the treatability of the majority of nonherpes STDs (e.g., gonorrhea and syphilis) may also explain the small effect of this variable. It may be more useful, in the future, to look at the effect of genital herpes as a predictor of condom use.

Perceived chance of contracting HIV did not show any differences across the stages of change. This finding may be related to the fact that the majority of participants felt that they had a 25% chance, with a only few participants reporting higher probability. The reason for the low perceived chance of contracting the virus may be related to the low prevalence in rural sites. In addition, these participants deny bisexual behavior and the majority are crack smokers only. In the United States, there is a perception that AIDS is a disease that strikes only gay men and intravenous drug users, which may reduce the likelihood that these participants would perceive themselves at high risk and reduce their perceived need to use condoms.

In summary, the validity of the staging algorithm was sup-

Table 6  
*Epidemiologic and Psychosocial Predictors by Stage of Change With Main Partner*

Predictor	Precontemplation		Contemplation		Action	
	Imp. $\chi^2$ at entry	Multiple odds ratio	Imp. $\chi^2$ at entry	Multiple odds ratio	Imp. $\chi^2$ at entry	Multiple odds ratio
Ethnicity	<i>ns</i>		8.03*		3.59	
White		<i>ns</i>		0.36		5.50
Hispanic		<i>ns</i>		1.2		0.93
Gender (female)	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Age	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Nonherpes STDs	<i>ns</i>		6.39		<i>ns</i>	
No episodes		referent		referent		referent
One episode		<i>ns</i>		0.25		<i>ns</i>
Two or more		<i>ns</i>		1.47		<i>ns</i>
Perceived chance of HIV infection	<i>ns</i>		<i>ns</i>		<i>ns</i>	
0%		referent		referent		referent
25%		<i>ns</i>		<i>ns</i>		<i>ns</i>
50%		<i>ns</i>		<i>ns</i>		<i>ns</i>
75%		<i>ns</i>		<i>ns</i>		<i>ns</i>
100%		<i>ns</i>		<i>ns</i>		<i>ns</i>
Assertiveness	9.94**	0.48	5.35*	0.63	59.03****	4.99
Pros	86.45****	0.32	32.30****	2.46	7.78**	2.91
Cons	3.48	1.47	<i>ns</i>	<i>ns</i>	2.80	0.35

Note. Blank cells indicate that data were not applicable. Imp.  $\chi^2$  = improvement chi square; *ns* = not significant; STDs = sexually transmitted diseases.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*\*  $p < .0001$ .

ported for use with not-in-treatment drug users. Convergent validity was found in the differences in variables previously shown to vary across the stages (i.e., pros, cons, and assertiveness) and separate questions related to self-reported risky sexual behavior. Discriminant validity was also established by the finding that drug use and frequency of intercourse with intravenous drug users did not vary significantly across the stages.

### Predicting Stage of Change

The contribution of gender, age, ethnicity, pros, cons, assertiveness, perceived chance of contracting HIV, and history of STDs to stage of change showed a number of similarities across main and casual partners as well as some differences. Low importance of the pros of condom use was a consistent predictor of inclusion in the precontemplation stage, whereas increased importance predicted membership in the contemplation stage for main and casual partners. The ratings of the importance of the pros continued to be important with main partners, when predicting the action stage. This finding is consistent with other studies (Prochaska, 1994) in which a one standard deviation increase in the importance of the pros was shown to predict a change from precontemplation to action. The changing relationship of the pros across the stages for casual partners is consistent with the ARRM, which suggests that a cost-benefit evaluation is important to develop commitment, but not for the implementation of condom use.

The cons of condom use were important for predicting inclusion in precontemplation and action for subjects with main partners, but they were nonsignificant with casual partners. Initiation of condom use with main partners may require both an

increase in perceived pros of condom use and a decrease in the negative aspects, whereas the pros of condom use with casual partners may be all that are necessary. The need for changes in the importance of the cons may also relate to a lower perceived need for condom use or increased difficulty in approaching the topic with main partners. The general finding that the importance of the negative aspects of condom use remains constant across the stages of change for casual partners is consistent with other studies (Prochaska et al., 1990; Prochaska et al., 1993). The lack of change in cons with casual partners may reflect an increased likelihood for relapse, because smaller overall change in their decisional balance. Condom use with main partners, on the other hand, may not relate to issues of safety or responsibility, but possibly to birth control. If this were true, it would be reasonable to expect the negative aspects of their use to affect the person's decision to use them. In other words, if the person doesn't find them to be troublesome or unnatural, then it would be likely he or she would use them with main partners.

Assertiveness was an important variable for participants with both partner types. Assertiveness with main partners was found to be important across all three stages. Specifically, the precontemplators and contemplators were lower in assertiveness than the participants in the action groups. Assertiveness for participants with casual partners was not an important discriminator for those in the precontemplation group, whereas level of assertiveness increased between the contemplation and action stages. The need for high assertiveness in the action group is reasonable, because this group is actively trying to use condoms and would need to be able to refuse unprotected sexual intercourse and talk to partners about the need for condom use. This



Table 7  
*Epidemiologic and Psychosocial Predictors of Stage of Change With Casual Partner*

Predictor	Precontemplation		Contemplation		Action	
	Imp. $\chi^2$ at entry	Multiple odds ratio	Imp. $\chi^2$ at entry	Multiple odds ratio	Imp. $\chi^2$ at entry	Multiple odds ratio
Ethnicity	<i>ns</i>		<i>ns</i>		<i>ns</i>	
White		referent		referent		referent
Hispanic		<i>ns</i>		<i>ns</i>		<i>ns</i>
Gender (female)	<i>ns</i>		<i>ns</i>		<i>ns</i>	<i>ns</i>
Age	4.39*	1.08	4.70*	0.93	<i>ns</i>	<i>ns</i>
Nonherpes STDs	<i>ns</i>		<i>ns</i>		<i>ns</i>	
No episodes		referent		referent		referent
One episode		<i>ns</i>		<i>ns</i>		<i>ns</i>
Two or more		<i>ns</i>		<i>ns</i>		<i>ns</i>
Perceived chance of HIV infection	<i>ns</i>		<i>ns</i>		<i>ns</i>	
0%		referent		referent		referent
25%		<i>ns</i>		<i>ns</i>		<i>ns</i>
50%		<i>ns</i>		<i>ns</i>		<i>ns</i>
75%		<i>ns</i>		<i>ns</i>		<i>ns</i>
100%		<i>ns</i>		<i>ns</i>		<i>ns</i>
Assertiveness	<i>ns</i>	<i>ns</i>	9.07**	0.29	62.21****	6.21
Pros	44.34****	0.27	15.42***	2.42	<i>ns</i>	<i>ns</i>
Cons	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>

Note. Blank cells indicate that data were not applicable. Imp.  $\chi^2$  = Improvement chi square; *ns* = not significant; STDs = sexually transmitted diseases.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . \*\*\*\*  $p < .0001$ .

finding is consistent with the predictions of the ARRM (Catania, Kegeles, et al., 1990) and studies that have examined assertiveness across the stages of change for condom use (Prochaska et al., 1990). The finding that assertiveness was the only significant predictor for inclusion in the action group with casual partners supports the notion that these subjects may be vulnerable to relapse as well as the need for further investigation into factors that affect one's decision to use condoms with casual partners. Alternatively, these result may indicate that once the subject decides to use condoms (i.e., enters the enactment or action stage), the ability to talk about and insist on condom use may lead directly to their use.

The ethnicity and age of the participant showed mixed results. Specifically, with main partners, White participants were more likely to be in action and less likely to be contemplators than African American participants, whereas those who were Hispanic were more likely to be in contemplation than those who were African American. These findings may indicate that intervention with African American participants, more than with White or Hispanic participants, needs to focus on factors that promote movement from contemplation to action. With casual partners, older participants tended to be in the precontemplation and contemplation stages. These findings may reflect an increased concern for safety in younger participants, a more positive attitude, or possibly higher promiscuity in the younger groups. In general, with larger sample sizes, it may be useful to examine predictors for different ages and ethnic groups separately.

The minimal effect of nonherpes sexually transmitted diseases may be related to the low frequency of STDs in this group as well as the perceived easy curability of most of the bacterial

STDs. Specifically, participants who have never had an STD may not consider it a risk and may not realize that the behaviors that result in catching an STD are the same as those for HIV. Alternatively, they may have made a connection between never having had an STD and a low likelihood of contracting HIV. The finding that participants with main partners who have had two or more episodes of an STD are more likely to be contemplators than those with one or less is reasonable, but possibly of little importance. The timing of the occurrence of the STD was not assessed and may have been before their current relationship, so it may not motivate the participant to use condoms with the current partner. In addition, the fact that the STD was cured reduces the need for using a condom to protect the partner and may serve to increase the participant's belief that it is unimportant. In the future, it may be important to look at more chronic problems, such as genital herpes, as a predictor of condom use. In this sample, the reported occurrence of herpes was too low to include as a predictor. Alternatively, even if infection by the herpes virus or other STDs predicts increased condom use, it is not a variable that can be directly manipulated to increase intention to use condoms, so it may not be very useful.

### Summary and Limitations

The utility of a stage model of change and the TMC in particular is twofold. First it is a handy tool for understanding where a person is in the change process so an appropriate approach to intervention may be chosen. Second, it provides a therapist with specific targets for behavior change strategies. These targets or antecedents of behavior change include (but should not be limited to) the pros and cons of change and assertiveness. The re-

sults of this study support the stages of change model for identifying intention to use condoms in not-in-treatment crack smokers and intravenous drug users. In addition, the systematic changes in the pros and assertiveness across the stages are consistent with the changes seen in other health behaviors (Prochaska et al., 1992). Finally, the lack of change in the importance of cons of condom use is also consistent with Prochaska et al.'s study with other high-risk groups (1990).

A number of factors appear to be important for promoting increased adoption of condom use by precontemplators. Similar to Prochaska's (1994) strong principle of progression from precontemplation to action, the pros of condom use increased at least one standard deviation between these two stages. Increased assertiveness also appears to be an important component of this progression, although the difference is less dramatic at this stage than in the transition from contemplation to action. Age appears to play a role in condom adoption, in that younger participants with casual partners were more likely to be in the action or maintenance stages. Prochaska (1994) has suggested that the therapy processes of consciousness-raising and self-re-evaluation may be especially beneficial for increasing perceived positive aspects of condom use, without necessarily adding new pros and cons. The data for this study was collected just before an intervention designed to increase awareness of risk and promote self-re-evaluation. The fact that participants had committed to this project suggests that they may have already increased their awareness of their risk, especially with casual partners. Changing behavior with main partners may be more difficult, because sexual risk for HIV is less certain if the subject is monogamous or not an intravenous drug user. The tendency for the cons of condom use to decrease as well as the correlation with assertiveness suggests that condom use with main partners may depend on the ability to discuss the issue and develop methods to reduce the negative perceptions of condom use.

Maintenance of behavior change is very difficult and has been shown to be low, even with subjects at high risk for HIV (Ekstrand & Coates, 1990; Stall & Ekstrand, 1989). The main difference between the contemplation and action group was an increase of assertiveness. This suggests that assertiveness may play the most important role in this transition, and additional research on principles of progression from contemplation to action will be needed to understand this further. Additionally, participants with casual partners may be at greater risk for relapse, especially as they spend time with the individual and responsibility and safety become less of an issue.

There are a number of limitations to this study that suggest additional research directions. The fact that this is a cross-sectional design makes assumptions about the ability to predict condom use from intention impossible. Although the regression of the independent variables on stage of change was an efficient predictor of stage, it will be important in the future to examine changes in pros and assertiveness in relation to stage of change over time. Another important step in this process will be to examine changes in condom use across time and its relationship to intention (stage). Experimental studies need to be performed to determine the interventions that are most effective in promoting change across different stages.

Future research should include assessment of additional cog-

nitve, emotional, and overt behavioral measures, such as the effect of adopting condom use because a partner desires it. The questions that need to be answered in this research are Does overt behavior change drive intention and commitment to use condoms or vice versa? and Once adopted, does the behavior change maintain if the participant moves to a new partner? To develop a comprehensive intervention and model of change, researchers need to examine additional measures, such as those identified by Fishbein et al. (1991). In addition, because the majority of health behavior change models are cognitive in nature, it will be important for future research to examine the effect of changing overt behaviors and any behavioral deficits that may be barriers to condom use. Finally, these participants were placed into three stages. As more variables are added to the model, it may be important to perform additional exploratory analyses to determine changes or differences in the stage structure.

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