

Safer Sex: Social and Psychological Predictors of Behavioral Maintenance and Change Among Heterosexual Women

Allison C. Morrill, Jeannette R. Ickovics, Victor V. Golubchikov, Susan E. Beren, and Judith Rodin
Yale University

Women of diverse backgrounds from 4 community health clinics in southern Connecticut were involved in a longitudinal, prospective study ($n = 189$). Data from interviews 3 months apart were used for the current analyses. The purpose of this study was to develop predictive models of safer sexual behavior among heterosexual women. Specifically, there was an interest in identifying factors to predict the maintenance or initiation of safer behavior over time. Relationship involvement and attitudes toward condoms were important in both models. Beyond this, differences in explanatory models emerged, reflecting the importance of examining behavior maintenance and change independently. Depression, health locus of control, and outcome efficacy belief made significant contributions to understanding the maintenance of safer sexual behavior. HIV counseling and testing, partner risk, and optimism helped to explain the initiation of safer sexual behavior. Implications for future interventions are discussed.

Heterosexual contact is the leading cause of the epidemic spread of HIV worldwide, and it is increasingly the leading means of transmission in the United States. In the United States, the proportion of women who most likely contracted HIV from male sexual partners increased from 11% in 1984 to 37% in 1993, representing more than 15,000 women (Centers for Disease Control [CDC], 1985, 1994). Despite this known risk for HIV and other sexually transmitted diseases, national studies indicate that less than half of sexually active women reported using condoms at all and even fewer reported using condoms consistently (Catania et al., 1991; Leigh, Temple, & Trocki, 1993; Potter & Anderson, 1993; Seidman & Reider, 1994). In the National AIDS Behavior Study, women who had risky sexual partners (e.g., partners who injected drugs) were

least likely to use condoms consistently (Grinstead, Faigles, Binson, & Eversly, 1993).

There has been limited research documenting patterns of sexual behavior and identifying determinants of risky or safe heterosexual behavior among women. Of the few studies in this area, most have been cross-sectional and correlational. Moreover, they have focused on a limited set of predictors, predominantly health behaviors. Use of drugs (particularly crack cocaine) and use of alcohol and drugs before sex have been associated with more unprotected intercourse (Harper, Lodico, DiClemente, & Coates, 1994; Kennedy et al., 1993; McCoy & Inciardi, 1993). Women with fewer past sexual partners, greater concern about sexually transmitted diseases, positive attitudes toward condoms, and who perceived men and peers as accepting condoms were more likely to practice safer sex (Campbell, Peplau, & DeBro, 1992; McCusker, Stoddard, Zapka, & Zorn, 1993; Sacco, Rickman, Thompson, Levine, & Reed, 1993; Valdiserri, Arena, Proctor, & Bonati, 1989; Weinstock, Lindan, Bolan, Kegeles, & Hearst, 1993). In one longitudinal study of heterosexual women with HIV-positive partners, unprotected vaginal intercourse at baseline was the strongest predictor of this behavior 2 years later; women decreased their risk during the study period, but many used condoms inconsistently despite having a known seropositive partner (Dublin, Rosenberg, & Goedert, 1992). Psychological factors and AIDS-specific beliefs that might influence women's sexual behavior have received limited attention to date.

Studies of gay and bisexual men have identified a number of psychological factors that are important correlates of sexual risk (e.g., Catania et al., 1991; Kelly et al., 1990; McKusick, Coates, Morin, Pollack, & Hoff, 1990; Valdiserri et al., 1988). Psychosocial factors associated with reduced risk included higher levels of self-efficacy, more internal health locus of control, more positive attitudes toward condom use, greater accuracy of personal risk estimate, greater social support, more clearly established peer norms for safer sex, and less depression.

Allison C. Morrill, Susan E. Beren, and Judith Rodin, Department of Psychology, Yale University; Jeannette R. Ickovics, Departments of Medicine and Psychology, Yale University; Victor V. Golubchikov, Department of Sociology, Yale University. Judith Rodin is now President of the University of Pennsylvania.

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Correspondence concerning this article should be addressed to Allison C. Morrill, who is now at the New England Research Institutes, 9 Galen Street, Watertown, Massachusetts 02172.

Older age, a seropositive HIV test result, and past condom use have been associated with less unprotected intercourse, whereas a history of multiple or anonymous sex partners, a greater number of past sexual partners, and intoxication preceding sex have been associated with more unprotected intercourse.

Fewer studies have determined factors that predict maintenance of safer sex or "relapse" to high-risk sexual behavior. In several prospective studies of men who have sex with men, individuals likely to relapse have been characterized as younger, with lower self-efficacy, and less positive attitudes toward condoms; they are more likely to have had unprotected anal intercourse, have a greater number of past sexual partners, have no close friends or lovers with AIDS, and engage in fewer health-related behaviors (deWit, Griensven, Kok, & Sandfort, 1993; Kelly, St. Lawrence, & Brasfield, 1991; Kippax, Crawford, Davis, Rodden, & Dowsett, 1993). Results from two studies highlight the importance of relationship status and interpersonal dynamics as factors affecting relapse (Ekstrand & Coates, 1990; Stall, Ekstrand, Pollack, McKusick, & Coates, 1990). However, given differences in background and behavior, we cannot assume that findings from gay and bisexual men are generalizable to heterosexual women (Ickovics & Rodin, 1992).

The purpose of this study was to develop models for predicting maintenance and initiation of safer sexual behavior among heterosexual women. We used data from a longitudinal prospective study of the effects of HIV counseling and testing (C&T) on women's sexual behavior. In analyses using the first three waves of data to assess the immediate impact of HIV testing on behavior, we found that approximately one half of sexually active women exhibited no change in behavioral risk from baseline to 3-month follow-up, whereas one quarter became riskier and one quarter became safer—regardless of HIV C&T (Ickovics, Morrill, Beren, Walsh, & Rodin, 1994). In the present report, we seek to identify factors that predict the initiation or maintenance of safe behavior over time. Knowledge of social, psychological, and behavioral factors that distinguish between women who practice safer sexual behavior versus those who do not can be used to develop interventions for women most at risk for HIV.

The present study uses a prospective longitudinal design, a community-based sample with social and demographic diversity, and a broad measurement framework to examine the effects of HIV C&T along with other predictors in a multivariate model. The study objectives were twofold: (a) For participants whose sexual behavior was safe at baseline (i.e., no unprotected intercourse during the past month), we sought to identify factors contributing to the maintenance of safe sexual behavior (vs. lapse); (b) for those whose sexual behavior was risky at baseline, (i.e., any unprotected intercourse during the past month) we sought to identify factors that contribute to the initiation of safer behavior. Because of the dearth of research in this area, we took a broad exploratory approach. The development of explanatory models was guided by the following hypotheses, gleaned from previous research on the determinants of sexual risk behavior from the few studies of women and from behavioral research conducted with gay and bisexual men:

1. Safer behavior would be promoted by the enhanced awareness of HIV-AIDS, as measured by perceived susceptibility to

HIV-AIDS, intrusive thoughts about HIV-AIDS, and knowing more people with HIV-AIDS.

2. Safer behavior would be promoted by a proactive stance toward HIV-AIDS, as reflected by HIV C&T, greater self-efficacy concerning HIV-AIDS, internal health locus of control, and outcome efficacy belief.

3. In terms of psychological indicators, optimism would be related to safer behavior at follow-up; anxiety and depression would inhibit safer sexual behavior.

4. Dislike of condom use—one's own and one's partners'—would inhibit safer sexual behavior.

5. Women with greater involvement in a relationship would be more likely to engage in unprotected intercourse.

Given the paucity of research concerning women and sexual risk behavior, alternate hypotheses might readily be advanced; nevertheless, these were the ones that guided the research.

Method

Study Participants

Participants were recruited into a study of the psychological and behavioral consequences of HIV counseling and testing from four urban community-based health clinics chosen to represent diverse client populations. Participants were women voluntarily seeking HIV C&T ($n = 117$), or women using other clinic services (ranging from ophthalmology to an annual exam) who had never been tested for HIV ($n = 72$). Pregnant women were not eligible. The two groups were selected so that the distribution by clinic, race, and age would be comparable. Approximately 80% of eligible women agreed to participate, and those included were representative of all women using services at these clinics. The study was then extended to allow assessment of behavior over time.

The retention rate over this 3-month study period was 93.4%. For these analyses, women who tested positive for HIV antibodies ($n = 8$) were excluded, because their sexual behavior after testing was no longer relevant to risk of contracting HIV. Women who had sex only with women ($n = 19$) were also excluded, because they did not engage in vaginal or anal intercourse. These exclusions and participant attrition resulted in a final sample size of 189.

Participants were diverse in social and demographic backgrounds. Age ranged from 18 to 56 years, with a mean age of 30.8 years ($SD = 8.2$). Fifty-one percent were White, 32.3% African American, 14.3% Latina, and 2.6% of other race-ethnicity. Education ranged from no formal education to graduate degrees; just under half (47.1%) had completed 12 years of school or less. Annual personal income was distributed as follows: below \$6,000 (30.7%), \$6,000–\$12,000 (38.1%), and greater than \$12,000 (31.2%). Sixty percent of study participants had one or more children. There were no sociodemographic differences between those who remained in the study and those who dropped out or were excluded.

Procedure

Recruitment and interview procedures are described in detail elsewhere (Ickovics et al., 1994). The data for these analyses were collected by means of structured interviews administered at two time points: after the initial clinic appointment ("baseline") and approximately 3 months later ("3-month follow-up"). Three months was considered sufficient for behavior change to occur and stabilize, yet not so long that participants might be lost because of moving or attrition.

Measures

Psychometrically valid and reliable instruments from other HIV-AIDS research were used to replicate and extend findings from studies

Table 1
Social and Psychological Predictors at Baseline

Variable	No. of items	Range	M (and SD)	Cronbach's α
Awareness of HIV-AIDS				
Perceived susceptibility	1	0%-100%	27.6 (24.0)	—
Intrusive thoughts about HIV-AIDS	15	1-4	1.79 (0.67)	.92
Know how many persons with HIV-AIDS	1	0-178	5.54 ^a (18.84)	—
Proactive stance toward HIV-AIDS				
Tested (HIV-seronegative) at baseline	1	Yes-No	62% tested	—
Self-efficacy	8	0%-100%	84.7 (12.6)	.70
Internal health locus of control	8	1-5	3.17 (0.58)	.60
Outcome efficacy belief	1	1-5	4.33 (0.71)	—
Psychological indicators				
Optimism	8	1-5	3.45 (0.64)	.74
Anxiety ^b	9	0-3	0.95 (0.67)	.84
Depression	15	0-3	1.24 (0.64)	.88
Attitudes toward condom use				
Dislike using condoms	1	1-5	2.68 (1.15)	—
Partner dislikes using condoms	2	1-5	2.99 (1.03)	.62

Note. Dashes indicate single items, not scale items.

^a Because the distribution is skewed, the mean is elevated. Roughly equal numbers of participants knew 0, 1-2, 3/more persons with HIV-AIDS. ^b One item (headaches) was dropped because it reduced the reliability of the scale.

of men to this study of women. Measures were adapted in several ways. Instead of written surveys, information was gathered through the use of structured interviews, aided by specific verbal instructions and the use of response cards. Based on pilot testing, measures were simplified to enhance comprehension. Interviews were conducted in Spanish for women whose primary language was Spanish and in English for all others.

To capitalize on the strengths of the longitudinal design, we used identical measures at both interviews. In this way, change and stability over time could be assessed. Information was collected in four areas: (a) sociodemographic and background characteristics; (b) psychosocial predictors (awareness of HIV-AIDS, proactive stance toward HIV-AIDS, psychological indicators, attitudes toward condom use); (c) relationship involvement and partner risk factors; and (d) sexual behavior. Summary information about social and psychological measures is presented in Table 1 and Table 2. Reliability of measures for this sample

Table 2
Relationship Involvement and Partner Risk Factors at Baseline

Relationship and partner risk factors	%	n	% of sexually active participants
Relationship involvement			
Single	29.6	56	
Regular partner	14.8	28	
Committed	31.2	59	
Cohabiting	24.3	46	
Partner risk factors			
No sexual partner	26.5	50	
No known risk	25.4	48	34.5
Uncertain/possible risk	43.9	83	57.7
High risk (injection drug user, sex with men or HIV-positive)	4.3	8 ^a	5.7

^a Of these, two women had a partner with HIV.

was evaluated using Cronbach's coefficient alpha for internal consistency.

Psychosocial Factors

Awareness of HIV-AIDS

Perceived susceptibility to HIV-AIDS. Participants estimated their chance of ever getting AIDS on a scale ranging from 0% (*definitely will not get AIDS*) to 100% (*definitely will get AIDS*).

Intrusive thoughts about HIV-AIDS. The Intrusion Subscale of the Impact of Events Scale, (Horowitz, Wilner, & Alvarez, 1979) as adapted by Antoni et al. (1990) was used to assess the extent to which participants experienced intrusive thoughts, strong feelings, and unwanted images related to the threat of AIDS. Scores were calculated as the mean of 15 items; response categories ranged from 1 (*not at all*) to 4 (*often*) on a Likert-type scale.

Knowing someone with HIV-AIDS. Participants were asked how many people they know who have died of AIDS, or who have HIV or AIDS.

Proactive Stance Toward HIV-AIDS

AIDS self-efficacy. Eight items, devised for this study, assessed self-efficacy pertaining to AIDS. Participants were asked to rate how certain they were that they could act to improve their health or reduce risk, such as talking to a health professional about AIDS or using a condom correctly. Response categories ranged from 0 (*very unsure*), to 100% (*very sure*).

Internal health locus of control. The Health Locus of Control Scale (Wallston, Wallston, & DeVellis, 1978) as modified by Kelly et al. (1990) was used to measure perceived control over the acquisition of HIV. This version includes the three dimensions of the original measure: internal control, chance-luck external control, and powerful others external control. Scores reflect the mean of eight items; response categories ranged from 1 (*strongly agree*) to 5 (*strongly disagree*) on a Likert-type scale. One item from the original scale was used separately

as an index of outcome efficacy belief; reliability for the overall measure was not diminished.

Outcome efficacy belief. Outcome efficacy belief refers to the belief that steps one might take to reduce risk of HIV will, in fact, reduce risk (Hochbaum, 1958; Rosenstock, 1966). A single item from the Health Locus of Control Scale was used for this variable.

Psychological Indicators

Optimism. The Life Orientation Test was used to measure dispositional optimism (Scheier & Carver, 1985). Respondents were asked how strongly they agree or disagree with statements such as "you always look on the bright side of things." The score was calculated as the mean of eight items, and response categories ranged from 1 (*strongly agree*) to 5 (*strongly disagree*) on a Likert-type scale.

Anxiety and depression. The short version of the Hopkins Symptom Checklist provided independent measures of anxiety and depression (Derogatis, Lopman, Rickels, Uhlenhuth, & Covi, 1974). Answers ranged from 0 (*not at all*) to 3 (*often*) on a Likert-type scale. Because of the nonnormal distribution of these scores, individual scores were ranked and participants were divided into quartiles reflecting relative anxiety and depression.

Attitudes Toward Condom Use

Dislike using condoms. Participants were asked to give their opinion on a 5-point Likert-type scale from 1 (*strongly agree*) to 5 (*strongly disagree*) on the statement, "You don't like using condoms because they cut down on your sexual pleasure."

Partner dislikes using condoms. Participants gave their opinions on a 5-point Likert-type scale from 1 (*strongly agree*) to 5 (*strongly disagree*) on two statements: "Your partner doesn't like using condoms because they cut down on his sexual pleasure," and "Your partner would be insulted if you suggested using condoms." These responses were averaged.

Relationship Involvement

Relationship involvement was determined by a hierarchical series of questions and a four-level ordinal relationship variable was devised: (a) single (not involved in any relationship), (b) having a regular sexual partner, (c) committed or married but not cohabiting, or (d) committed or married and cohabiting.

Partner Risk Factors

Participants indicated whether any sexual partner during the previous month had any of the following risk factors (responses were "no," "yes," or "maybe or unsure"): shoots drugs with a needle, has sex with men, has sex with other women, or is HIV positive. Hierarchical analysis of the responses produced an ordinal measure of the relative likelihood of a partner having HIV: (a) no partner with any known risk factor, (b) any partner who may have other female sexual partners, (c) any partner who may have male sexual partners or who may inject drugs, and (d) any partner with high-risk (e.g., injects drugs) or HIV-positive status. This information was obtained only from participants who had been sexually active during the month preceding each interview. Data concerning partner's serostatus was obtained only for those with a primary partner; therefore, it was not feasible to include this variable in the analyses. No other source was used for data concerning partners' serostatus or behavior; hence, the accuracy of participants' assessments is unknown.

Sexual Behavior-Risk

Participants were asked about their sexual behavior using questions similar to those developed for the Multicenter AIDS Cohort Study (e.g., Adib, Joseph, Ostrow, & James, 1991). Sexual activities specific to women were added. Respondents reported the number of times they engaged in vaginal and anal intercourse during the month preceding each interview, as well as the number of times condoms were used. The 1-month time frame was selected because recall of sexual activity that occurred more than 1 month previously declines sharply, yet a month is long enough to average out brief periods of greater or lesser activity.

Engaging in any unprotected vaginal or anal intercourse was classified as "risky" behavior. "Safe" behavior was defined as not engaging in any unprotected intercourse. The "safer" classification included women who did not engage in any sexual intercourse, as well as those who always used condoms for intercourse. The dependent measure in all analyses was sexual behavior (safer or risky) at the 3-month follow-up interview. Number of sexual partners was not included in the dependent measure because it was confounded with partner risk factors. We asked whether any partner had each the risk factor; hence, more partners make an affirmative response more likely. At the same time, if a woman reported that none of her partners had any risk factor, we were reluctant to presume that those partners were necessarily riskier than a single partner.

Statistical Analyses

Separate analyses were conducted for two groups: women whose sexual conduct at baseline was safer ($n = 88$) and those whose conduct at baseline was risky ($n = 101$). The main objective was to determine what combination of variables best predict safer behavior at follow-up for each group. To select the most valuable combination of variables for inclusion in the final model, we designed a systematic series of multivariate analyses, adapting the procedures used by Rodin and McAvay (1992).

Three categories of predictors were considered. The first group of predictors included sociodemographic characteristics and psychosocial predictors measured at baseline. Second, to account for differences over time, changes in psychosocial predictors from baseline to follow-up were examined. Third, we considered relationship involvement at baseline and at follow-up, and baseline partner risk. Partner risk was included only for the risky subsample and only the baseline measure, because these data were available only for women who engaged in intercourse during the month preceding each interview.

We performed multivariate analyses for each group using a hierarchical sequence of logistic regression equations. In the first step of the sequence, sociodemographic characteristics and baseline predictors were entered into the regression equation. Nonsignificant variables were removed from the equation, beginning with the least significant variable, until all variables remaining in the equation had a significance of $p < .20$. Initially, a high-entry criterion was used so as not to discard variables that might become stronger when others were added and removed in subsequent steps. At each step, we carefully monitored potential confounding, noting whenever deletion of a variable resulted in a substantial change in the parameter estimate of a variable remaining in the model.

We also tested for significant effects of any predictor in interaction with HIV C&T to account for the original sampling strategy (i.e., women seeking HIV C&T vs. those never tested) and because HIV counseling addressed psychological factors measured here (e.g., perceived susceptibility, self-efficacy). In testing for interactions with HIV C&T, we used stepwise regression, with a criterion of $p < .20$.

In the second step of the sequence, changes in predictors from baseline to follow-up were added. Only change values that were associated with sexual behavior in bivariate analyses ($p < .20$) were added to the

regression equation to test for significance in the multivariate framework. We tested change indicators in the presence of baseline predictors to control for initial values. At the end of the step, nonsignificant baseline predictors were dropped unless their removal noticeably altered coefficients for corresponding change or other variables (Rodin & McAvay, 1992). Other nonsignificant variables were removed from the model so that all remaining had a significance of $p < .20$. Again, we used stepwise regression to test for the effects of any of the change indicators in interaction with HIV C&T.

In the third step, relationship involvement at baseline and follow-up, and baseline partner risk for those whose conduct was risky at baseline, were added to the equation. Nonsignificant variables were removed from the equation, beginning with the least significant variable, until all variables remaining in the equation had a significance of $p < .05$. In this step, nonsignificant variables included to control for baseline levels were removed if doing so did not substantially change other parameter estimates. The resulting combination of variables constituted the final model for predicting maintenance or initiation of safer sexual behavior over time.

Results

Comparison of Women With Safer Behavior Versus Those With Risky Behavior at Baseline

At baseline, 46.6% ($n = 88$) of the respondents engaged in safer behaviors (i.e., had no unprotected intercourse in the month preceding the interview), and 53.4% ($n = 101$) had risky behaviors. We conducted bivariate analyses to identify differences between those with safer versus risky behavior at baseline. The women with safer conduct at baseline were evenly distributed among age groups (i.e., less than 25, 25-39, greater than 39), whereas 72.3% of the women with risky conduct at baseline were between the ages of 25 and 39, $\chi^2(2, N = 189) = 16.1$, $p < .001$. More of the safer women had a regular partner or committed relationship, $\chi^2(3, N = 189) = 46.7$, $p < .001$. Women who had no unprotected intercourse had more favorable attitudes toward condoms, $t(187) = -3.13$, $p < .01$, as did their partners, $t(187) = -2.70$, $p < .01$. There were no other differences between the two groups.

Sexual behavior at baseline was a strong predictor of behavior at follow-up. The majority of women maintained behavior: 74% of those safer at baseline were safer at follow-up (65 of 88), and 79% of those risky at baseline were risky at follow-up (80 of 101). Approximately equal numbers of women changed in opposite directions: 26% of those safer at baseline changed to risky behavior, and 21% of the risky group changed to safer behavior.

Multivariate Logistic Regression of Predictors of Safer or Risky Sexual Conduct at Follow-Up

Findings from the interim steps are presented in the accompanying tables and described briefly. Detailed description is provided only for the final model.

Maintaining Safer Behavior

The following results pertain only to the women whose conduct at baseline was safer (i.e., they had no unprotected intercourse).

In the first step of the sequence, sociodemographic variables

and baseline psychosocial predictors were entered into the regression equation (see Table 3). None of the sociodemographic characteristics or AIDS awareness indicators remained in the model, nor was any interaction with HIV C&T added. Higher depression at baseline was significantly associated with maintaining safe behavior at follow-up. Five additional variables were retained in the model.

In the second step of the sequence, three changes in predictors were added to the regression equation (see Table 3), along with baseline indicators to control for the initial values. Women who maintained safer behavior increased their sense of internal health locus of control, and their attitudes toward condoms became more favorable.

In the third step, less intimate relationship involvement at follow-up improved the likelihood of maintaining safer behavior. After relationship was added, five variables in the earlier model were dropped because they were no longer statistically significant.

Final Model for Behavioral Maintenance

In the final model (see Table 4), three baseline predictors, three change predictors, and relationship involvement at follow-up were associated with safer behavior at follow-up. Women with greater belief in outcome efficacy at baseline were more than nine times as likely to maintain safer behavior at follow-up. Those who experienced an increase in health locus of control from baseline to follow-up were seven times as likely to maintain safer behavior. Women with higher depression scores at baseline and those who became more depressed between baseline and follow-up were significantly more likely to maintain safer behavior. Dislike of condoms at baseline and change in dislike from baseline to follow-up were also significant predictors of sexual behavior. As dislike for condoms increased (or the change from baseline to follow-up increased), women were three times less likely to maintain safer behavior.

Of all the predictors, relationship involvement at follow-up was most closely associated with sexual behavior. Women with less involved or committed relationships were 11 times as likely as their counterparts in more committed relationships to maintain safer behavior. In other words, women in committed relationships were more likely to lapse from safer behavior to risky behavior over the study period).

The final model was repeated to include only women who were sexually active over the study period and were safer at baseline ($n = 67$; i.e., excluding women not sexually active). The model was stable, and all coefficients were in the same direction and of the same magnitude as when analyzed with the larger sample.

Adopting Safer Behavior

The following results pertain only to women whose conduct at baseline was risky (engaged in unprotected intercourse).

Seven baseline predictors remained in the model at the conclusion of the first step (see Table 5). African American women were more likely to adopt safer sexual behavior at follow-up. Optimism and HIV C&T were positively associated with adopting safer sexual behavior. None of the HIV-AIDS awareness

Table 3
Hierarchical Logistic Regression of Predictors on Safer-Risky Sexual Behavior at Follow-Up—Among Participants Whose Behavior Was Safer (No Unprotected Intercourse) at Baseline (n = 88)

Variable	Step 1 ^a (baseline predictors)		Step 2 ^b (follow-up predictors)		Step 3 ^c (relationship)	
	Estimate	<i>p</i>	Estimate	<i>p</i>	Estimate	<i>p</i>
Step 1. Baseline predictors						
Perceived susceptibility	-0.15	.13	-0.33	.02		
Tested ^d			3.19	.02		
Self-efficacy	-0.34	.17				
Internal health locus of control ^e				.80		
Outcome efficacy belief	0.67	.09	1.49	.02	2.26	.01
Anxiety	-0.76	.06	-1.20	.06		
Depression	0.84	.01	0.97	.10	1.33	.02
Dislike using condoms			-0.88 ^e	.03	-1.10	.02
Partner dislikes using condoms	-0.45	.15				
Step 2. Predictors—change at follow-up						
Change in health locus of control			3.86	.01	1.98	.01
Change in depression			-1.24	.10	-2.15	.02
Change in dislike using condoms			-2.09	.01	-1.18	.01
Step 2. Predictors—interactions with Tested						
Change in HLC ^a × Tested			-3.01	.05		
Change in dislike of condoms ^a × Tested			1.55	.07		
Step 3. Relationship						
Relationship involvement at baseline						
Relationship involvement at follow-up					-2.41	.0002

Note. HLC = health locus of control.

^a Area inside the curve (AIC) = 99.18. ^b AIC = 86.93. ^c AIC = 59.64. ^d Included to control for interaction terms. ^e Included to control for baseline level.

indicators remained in the model, nor was any interaction of a baseline variable with HIV C&T added.

Change in outcome efficacy belief was added because it was significant in bivariate association with sexual risk. However, when tested in the second step of this multivariate analysis, it was not significant at $p < .20$ and, hence, this step resulted in no change.

Relationship involvement at follow-up and partner risk contributed significantly to the model when added in the third step. A less involved relationship and higher partner risk were each associated with adopting safer behavior.

Final Model for Behavioral Change

In the final model (Table 6), women who were tested for HIV were nearly five times more likely to initiate safer sexual behavior. Women with higher optimism were four times more likely to adopt safer sexual behavior at follow-up. Those who disliked using condoms were one half as likely to initiate safer sexual practices. Relationship involvement and partner risk were also associated with sexual behavior: women who were less involved with men and those with higher risk partners were two to three times more likely to adopt safer sexual behavior at follow-up.

Table 4
Hierarchical Logistic Regression of Predictors on Safer-Risky Sexual Behavior at Follow-Up—Among Participants Whose Behavior Was Safer (No Unprotected Intercourse) at Baseline (n = 88)—Final Model With Odds Ratios

Variable	Estimate	SE	<i>p</i>	Odds ratio	95% CI
Outcome efficacy belief	2.26	0.93	.01	9.6	1.5–61.2
Depression	1.33	0.58	.02	3.8	1.2–12.1
Dislike using condoms	-1.10	0.48	.02	0.3	0.1–0.9
Change in health locus of control	1.98	0.75	.01	7.2	1.6–32.3
Change in depression	-2.15	0.95	.02	0.1	0.0–0.8
Change in dislike using condoms	-1.18	0.47	.01	0.3	0.1–0.8
Relationship involvement at follow-up	-2.41	0.64	.0002	0.1	0.0–0.3

Note. CI = confidence interval.

Table 5
Hierarchical Logistic Regression of Predictors on Safer-Risky Sexual Behavior at Follow-Up—Among Participants Whose Behavior Was Risky (Any Unprotected Intercourse) at Baseline (n = 101)

Variable	Step 1 ^a (baseline predictors)		Step 2 ^b (follow-up predictors)		Step 3 ^c (relationship)	
	Estimate	p	Estimate	p	Estimate	p
Step 1. Baseline predictors						
Education	0.39	.19	0.39	.19		
Age (40 or older)	1.59	.09	1.59	.09		
Ethnicity (African American)	1.24	.05	1.24	.05		
Tested for HIV at baseline	1.78	.01	1.78	.01	1.55	.05
Self-efficacy	-0.41	.11	-0.41	.11		
Optimism	1.34	.02	1.34	.02	1.48	.04
Dislike using condoms	-0.40	.14	-0.40	.14	-0.60	.05
Step 2. Change at follow-up						
Change in outcome efficacy belief						
Step 3. Relationship						
Relationship involvement at baseline						
Relationship involvement at follow-up					-1.19	.0002
Partner risk at baseline					0.70	.05

^a Area inside the curve (AIC) = 101.65. ^b AIC = 101.65. ^c AIC = 79.16.

Discussion

The purpose of this study was to develop predictive models of safer sexual behavior among heterosexual women. Using a broad, exploratory approach, we sought to identify the social, psychological, behavioral and demographic factors that influenced the maintenance and initiation of safer sexual behavior. Two factors were important in both models: relationship involvement and attitudes toward condoms. Beyond this, differences in explanatory models emerged, reflecting the importance of examining behavior maintenance and change independently.

Most research has not considered the interpersonal context of sexual behavior, failing to distinguish between casual sexual relationships and committed partnerships. One exception is the work of Kippax et al. (1993), who refer to unprotected intercourse in the context of certain relationship arrangements as "negotiated safety"—a strategy that depends on accurate knowledge of both partners' serostatus as well as honesty and trust in the relationship. However, others (cf. Ekstrand, 1992)

warn that anything less than complete monogamy between two seronegative partners carries some risk of HIV transmission; because any uncertainty results in some risk, condoms should always be used to maximize prevention. According to this view, only long-term and consistent adoption of safe sexual practices—condom use with all partners, as well as abstinence or deferment of sexual intercourse—will reduce further spread of HIV.

As failsafe as the latter approach may sound ("no unprotected intercourse, no risk"), it clearly does not reflect current practices observed in this and other studies (Hobfoll, Jackson, Lavin, Britton, & Shepherd, 1993; Morrill, 1994). Instead, women in this study who were in more involved relationships were significantly more likely to engage in unprotected intercourse. This was true at follow-up, regardless of behavior at baseline. Women who had unprotected intercourse at baseline made another important distinction: Those who perceived their partners to be riskier were more likely to become safer in their sexual practices.

Table 6
Hierarchical Logistic Regression of Predictors on Safer-Risky Sexual Behavior at Follow-Up—Among Participants Whose Behavior Was Risky (Any Unprotected Intercourse) at Baseline (n = 101)—Final Model With Odds Ratio

Variable	Estimate	SE	p	Odds ratio	95% CI
Tested for HIV at baseline	1.55	0.79	.05	4.7	1.0 ^a -22.7
Optimism	1.48	0.71	.04	4.4	1.1-18.3
Dislike using condoms	-0.60	0.31	.05	0.6	0.3-1.0 ^a
Relationship involvement at follow-up	-1.19	0.32	.0002	0.3	0.2-0.6
Partner risk at baseline	0.70	0.36	.05	2.0	1.0 ^a -4.1

Note. CI = confidence interval.

^a By definition, when p = .05, the lower or upper limit of the confidence interval equals 1.0.

The strong association between relationship involvement and safer sex in both models indicates that women accommodate their sexual behavior depending on the nature of their relationship. They manifest neither blind faith in the protective powers of condoms nor reckless risky behavior with casual sex partners. Women do not view abstinence and condom use as the only means of protection from HIV; rather, they adjust their sexual practices according to the level of involvement with a partner. In a committed couple, unprotected sex might be seen as a token of trust, as if women are compromising some degree of safety in favor of enhancing the quality of the relationship. This exchange might be advantageous if the male partner is indeed committed and HIV negative. Unfortunately, assessments of partner risk can be inaccurate; consequently, some women having unprotected intercourse in a committed relationship are actually at increased risk for contracting HIV. These data support the notion that heterosexual women may still erroneously believe that they are not at risk for HIV (Kalichman, Hunter, & Kelly, 1992). In terms of prevention, if condom use is not an acceptable option for a given couple (e.g., when pregnancy is desired), then a secondary goal might be to encourage women to substitute partner testing in lieu of relying on their subjective assessment of partner risk.

Attitude toward condom use was another factor important in both the initiation and maintenance of safer behavior. As predicted, women with positive attitudes toward condom use were significantly more likely to use them with sexual partners. Women's own attitudes toward condoms were more important than their partners' attitudes in both models. In the absence of other effective barrier methods to prevent transmission of HIV, prevention interventions must promote the acceptability and desirability of condom use from the woman's perspective.

Two additional factors made a contribution to the understanding of change from risky to safer sexual behavior: (a) optimism and (b) HIV counseling and testing. Women who were more optimistic at baseline were more likely to initiate safer behavior. This finding is in accord with other studies where dispositional optimism has been related to health-promoting behaviors (see Scheier & Carver, 1992, for a review).

Among the women who were risky at baseline, those who received HIV C&T were significantly more likely to initiate safer sex. This finding departs from "the limited effects of HIV C&T" that we reported previously (Ickovics et al., 1994). The difference in these analyses is the independent examination of those who were risky versus safer at baseline.¹ Public health professionals have maintained that HIV counseling along with testing can be an effective prevention intervention, because it provides the opportunity to assess personal risk and promote preventive behaviors. However, previous studies have found that among those who are HIV negative, HIV C&T has not had a major impact on behavior change (see Higgins et al., 1991, for a review). Our results suggest that HIV C&T may have a positive impact for those who have been engaging in unprotected intercourse; however, among those who were safer at baseline, HIV C&T was not related to maintenance of safer behavior. According to the Transtheoretical Model of Change advanced by Prochaska, DiClemente, and Norcross (1992), interventions are more efficacious when adapted to an individual's stage of change. In terms of that model, we would say that HIV C&T

was apparently more influential for individuals with risky behavior who may have been contemplating or preparing to initiate safer behavior than for those already in the action or maintenance stages.

Among the women who were safer at baseline, in addition to relationship involvement and attitudes toward condoms, outcome efficacy belief, and change in health locus of control were associated with behavioral maintenance. We consider these to be indicators of a "proactive stance toward HIV-AIDS." In other words, for women who believed that if they took the right steps they could prevent HIV (outcome efficacy) and those whose sense of internal control over their health increased over the study period, maintaining safer behavior is a way of taking charge of their health. This reveals a consistency between belief and action: Those who perceived more control over HIV prevention were more likely to practice safer sex. To improve the effectiveness of HIV counseling for maintaining safer sexual practices, counselors may do well to focus on bolstering outcome efficacy beliefs and internal health locus of control.

Finally, contrary to expectation, women who were more depressed or who became more depressed between baseline and follow-up were more likely to maintain safer behavior. Post hoc analyses indicated that this association was influenced by the subgroup of women who were not sexually active. Clinically, this is not surprising, because the dampening effects of depression on libido are well known, and this is one of the clinical indicators that would be assessed in reaching a diagnosis of depression. It is possible that as depression abates, past risk behavior would recur. Nevertheless, when we reanalyzed the model, excluding women who were not sexually active, the results were stable.

Strengths of this study include its longitudinal design, enabling a prospective examination of behavior change and maintenance. The interviews included a broad array of demographic, social, and psychological indicators. Study participants were a diverse group of clients attending community health clinics. However, the study sample was not randomly selected; therefore, the generalizability of these results remains to be demonstrated. Also, because nonsignificant variables were removed due to the sample size, although rigorous precautions were taken, these results might be somewhat idiosyncratic; therefore, the study should be replicated with a larger sample.

Wyatt (1994) has argued that research on sex-related health has been inadequate, in large part because research has failed to take into consideration gender, social class, race, and culture. Long-term strategies for minimizing sexual risk must directly assess similarities and differences in gender, culture, and economics. She cites recommendations from the National Commission on AIDS to "expand research in behavioral epidemiology to assess what occurs; in cognitive science to determine why it occurs; on cultural and ethnographic factors that influence

¹ Another difference was the operationalization of sexual risk. In this study, sexual risk was dichotomized to indicate whether study participants engaged in unprotected sexual intercourse. In the previous study, a composite measure of sexual risk was created that took into consideration partner risk as well as unprotected sexual intercourse, resulting in a hierarchically arranged variable with four categories.

behavior; in intervention research to determine what works in reducing risks" (Michelson, 1993, p. 4).

In light of our findings, future research should examine further the nature of relationships and the interpersonal context of decision making for heterosexual women. It is important to recognize the complexity of individual choice and human intimacy. It is also important to study behavior patterns over a longer period of time than 3 months. Effects of HIV C&T might be delayed, and long-term, stable behavior may emerge from lengthy periods of fluctuation. Longer term follow-up is, therefore, necessary to identify the social and psychological factors associated with both the initiation and maintenance of safer sexual behavior.

The results of this study can help guide future interventions for heterosexual women at risk for HIV. These interventions might occur as part of HIV counseling and testing or other venues. Unified calls for abstinence and protected intercourse only are appropriate, particularly for women at greatest risk for HIV; however, the context of women's lives and relationships must also be acknowledged. Many heterosexual women will continue to have unprotected intercourse. It is essential for women to understand that they are at greater risk than men for contracting HIV through heterosexual intercourse. Interventions should help them to evaluate more accurately their own risk and the risk of their partners, encourage HIV testing for both partners, promote a positive attitude toward condoms within relationships, and enhance a proactive stance toward HIV by increasing feelings of self-efficacy and outcome efficacy. Both the initiation and maintenance of safer sexual behavior for women must be encouraged in our efforts to enhance health promotion and risk reduction.

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