

REDUCING DENIAL AND SEXUAL RISK BEHAVIORS IN COLLEGE STUDENTS: A COMPARISON OF A COGNITIVE AND A MOTIVATIONAL APPROACH

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ABSTRACT

This study compared two interventions designed to decrease denial of sexually transmitted disease (STD)/human immunodeficiency virus (HIV) risk, to increase purchase of and intent to use condoms, and to decrease sexual risk behaviors. One hundred and fifty sexually active male and female undergraduates were assessed at baseline for denial of STD/HIV risk, knowledge of sexual risk behaviors, and self-reports of sexual behavior and were randomly assigned to either a motivational or cognitive intervention or a control condition. After the intervention, subjects were offered the opportunity to purchase condoms and were assessed for denial and intent to use condoms. Two months later, sexual risk behaviors and denial were measured. The motivational approach was most effective in reducing denial and in increasing intent to use condoms immediately following the intervention and in reducing sexual risk behaviors 2 months later.

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INTRODUCTION

Sexually transmitted diseases (STDs) and the human immunodeficiency virus (HIV) pose a significant threat to individuals engaging in unprotected sex. While the majority of young adults have fairly accurate knowledge about STD/HIV transmission, risk behaviors, and precautionary behaviors (1,2), this does not imply a complete understanding (3), and there is no relationship between this knowledge and the adoption of precautionary behaviors (4–8). Despite being aware of their risks and the severity of HIV, evidence indicates that these young adults do not feel personally susceptible (9). By denying their own susceptibility, they put themselves at greater risk by not taking the necessary preventive or precautionary actions. This denial of personal susceptibility to negative events, such as STDs/HIV, has been shown to be particularly pronounced among adolescents (10,11). However, evidence shows that perceived susceptibility to STDs is related to intentions to use condoms in the future (12). Further, intentions are predictive of subsequent reports of condom use (12). Therefore, it is important to address denial in college students, to increase their perceived susceptibility to STDs/HIV, and thus to increase their preventive behaviors, particularly in light of the increasing prevalence of STDs and HIV on college campuses (13).

The present study compares two approaches to reducing denial, changing behavior, and maintaining these changes over

time. The first is a social cognition approach which reduces denial by giving individuals accurate information about their own risk level relative to that of their peers (14,15). This approach assumes individuals will accept the information, internalize it, and use it to change their behavior in future sexual encounters. The second approach is a motivational one which creates an uncomfortable state of dissonance in order to reduce denial about STD/HIV risk (16,17). This approach assumes that individuals need to be internally motivated in order to change their behaviors. While many differences exist between these two approaches, the purpose of this study is to compare the overall effectiveness of these two techniques to change behavior.

SOCIAL COGNITION APPROACH

Individuals who engage in unprotected intercourse may deny their risk for STDs and HIV due to a cognitive error in assessing their own risk relative to others. Individuals incorrectly perceive their own risk to be lower than their peers because they do not take into account the frequency of their peers' protective sexual behaviors. The social cognition approach argues that this error can be corrected by increasing information and awareness in college students about their risk for STDs/HIV relative to others, by giving them accurate information about the prevalence of their peers' risk behaviors. Correcting these biases should reduce perceived invulnerability, thereby reducing denial. The social cognition perspective suggests that a cognitive error, identified in the literature as unrealistic optimism (18), is responsible for the inaccurate risk assessments which individuals make.

Unrealistic optimism is the belief held by most people that misfortune will strike others and not themselves (18–20). This form of denial is particularly relevant in regards to STD and HIV risk because of the controllable nature of STD/HIV risk factors. Studies have shown the more controllable the risk for a negative event, the more unrealistic optimism is evoked (14,18,19,21,22). Evidence indicates sexually active adolescents perceive their risk of HIV to be lower if they believe themselves to have control over the possibility of contracting HIV (22), and that they underestimate their risk of contracting an STD or HIV to a greater extent than other negative events, such as car accidents and skin cancer (23).

Efforts to reduce this type of denial have focussed on changing egocentric thought processes, which are largely responsible for motivating unrealistic optimism (19,20). Various methods have been used to make subjects think less egocentrically and more about their peers' risk and precautionary behaviors (15). Results indicate that providing knowledge of others' risk levels and even having subjects simply think about their peers' risk levels reduce unrealistic optimism significantly; however, they do not always eliminate the optimistic biases. Avis, Smith, and McKinlay (24) found that specific information about level of risk influenced

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people's perceived risk judgements for developing heart disease. Also, results on increasing perceived risk for stroke and decreasing perceived risk for cancer indicate that individualizing information and giving behavioral change information is effective in making risk perceptions more accurate (25). These results emphasize the importance of accurate information in counteracting egocentric bias.

Evidence exists that this form of denial can be reduced by giving information about peer standing on risk factors or by forcing subjects to think about their peers' standing (15,18,24). However, the relationship between unrealistic optimism and behavior is very complex (26), and these studies did not examine effects of reducing this form of denial on behavior itself. Further, none of the studies on unrealistic optimism have focussed on sexual behaviors. In fact, the contexts in which unrealistic optimism has been examined included more remote health risks, such as heart disease and cancer, rather than immediate behaviors like sexual activity. The only study which did examine the relationship between perceived susceptibility and self-protective behaviors (27) found that an intervention to reduce unrealistic optimism did not influence adoption of self-protective behaviors. None of these studies have examined changes in unrealistic optimism or behavior over time. One of the goals of this study was to examine whether reducing this form of denial would have lasting effects on individuals' intent to change behavior and behavior itself.

MOTIVATIONAL APPROACH

The motivational perspective argues that giving information to produce a cognitive change is not sufficient to reduce denial. Evidence indicates that when people are frightened, they use denial in an effort to convince themselves that a threatening event (such as acquired immune deficiency syndrome [AIDS]) is unlikely to happen to them (28). Denial should be most effectively reduced by indirect approaches which avoid increasing anxiety about threatening events. One way to reduce denial indirectly is by inducing dissonance using a hypocrisy paradigm to make individuals aware of the discrepancies between their beliefs about the importance of condom use and their own unsafe behaviors. The hypocrisy paradigm induces dissonance by having individuals give advice about condom use which is inconsistent with their own past behaviors. This should motivate individuals to change their behaviors to coincide with the procondom beliefs they are espousing to others. This paradigm can be considered indirect because it elicits change in individuals by having them influence others in order to produce change in themselves. Such an approach also requires higher levels of personal involvement which have been shown to be more effective than informational approaches (e.g. informing people of risk) in attitude and behavior change (29).

Hypocrisy induction has been used effectively to create dissonance in order to reduce denial and change behavior (16,17,30). Specifically, the hypocrisy paradigm used in promoting safe-sex behaviors is a technique which makes individuals feel mindful of their own past failures to use condoms and requires them to give a speech on the importance of precautionary behaviors to persuade others to adopt those behaviors. Individuals are confronted with the notion that they are not practicing what they are preaching and therefore experience feelings of hypocrisy or cognitive dissonance. To reduce the dissonance, a change must be made in their behaviors.

Using this paradigm, Aronson and colleagues (16) found that subjects who were made mindful of their own previous risky behaviors and who delivered the speech in front of the camera showed greater intent to improve condom use in the future and less denial than subjects in comparison conditions. The three comparison conditions included a group who only delivered the speech in front of the camera, a group who were only made mindful of their own previous risky behaviors, and a control group of low-mindful, no-speech subjects. Three months later, subjects in the hypocrisy condition still scored higher, though not significantly, on self-reports of condom use than subjects in the other groups. A second study found that more subjects in the hypocrisy condition purchased condoms at the end of the study than subjects in the other conditions (17). Again, follow-up interviews 3 months later indicated that subjects in the hypocrisy condition reported a slightly higher frequency of condom use ($p < .12$) than any of the control groups.

These findings support the idea that dissonance induction may be an effective route to lasting behavior change. While only a few early studies document long-lasting changes resulting from classic dissonance paradigms (31), more current research has increasingly demonstrated long-term effects of dissonance reduction techniques (16,17,32). The reasoning behind the long-term effects of dissonance theory focuses on the amount of self-justification and self-involvement which is required (33). The more work which self-justification requires on the part of the individual, the stronger and longer lasting the attitude change (33). Since the attitude change in the motivational approach is motivated internally by a state of dissonance, it should be more powerful than had it been externally motivated, as in the cognitive approach. This is similar to Lewin's (29) explanation of why personal involvement and voluntary decisions are more effective in changing attitudes than a formal approach which simply provides information to passive recipients. It is expected that the motivational approach would be more powerful than the cognitive approach in eliciting effects that will be sustained beyond immediate postassessment.

SUMMARY OF DESIGN AND HYPOTHESES

This study compared the efficacy of two contrasting social psychological approaches to reducing denial of STD/HIV risk in college students. The social cognition approach was operationalized using a cognitive intervention modeled after one used by Weinstein (14). The motivational approach was operationalized using an intervention modeled after one used by Stone and colleagues (17). A control condition was used to compare the effectiveness of the interventions relative to no intervention.

First, it was hypothesized that the motivation condition would be most effective in reducing denial, in increasing intent to use condoms in the future, and in motivating condom purchasing behaviors. Second, it was expected that the effects in the motivation condition would be more lasting over time, while any effects found in the cognitive or control conditions would be temporary. The general purpose of this study was to determine which of these theoretically informed interventions would have effects that would be sustained beyond postassessment.

METHODS

Overview

Assessments took place at three time points. To protect subjects' confidentiality, identification numbers were assigned at baseline assessment and used to track subjects through Time 3 assessment. At the first time point, prior to the experimental

conditions, subjects completed a questionnaire assessing baseline levels of denial, general knowledge of sexual risk behaviors, and self-reports of sexual behavior. At the second time point, subjects were randomly assigned to one of the three conditions and, after participating, completed a questionnaire which assessed denial, specific knowledge about STD/HIV, and intent to change future behavior. At this time, level of involvement in the study and social desirability were also assessed. At the third time point, 2 months later, long-term effects of the conditions on sexual risk behaviors and denial were measured through telephone interviews. Subjects were fully debriefed at the end of the interview.

Subjects

Six hundred male and female undergraduates from two introductory psychology classes at a state university in the northeast completed the baseline questionnaire at Time 1 in exchange for experimental credit. Of these, 303 indicated that they had previously been sexually active and had not been tested for HIV. Subjects who had been tested for HIV were screened out because it was likely that HIV-tested subjects might have already experienced dissonance about their AIDS-related behaviors, thereby preexposing them to one of our experimental factors. A total of 150 subjects, 59 (44%) men and 91 (53%) women, agreed to participate in the second part of the study. Of the 103 who did not choose to participate, 50 refused to participate in any experiments during the semester, 45 did not return recruitment phone calls, 41 had previously completed their experimental credit requirements, 11 were not interested in participating, and 6 were scheduled to participate but did not keep their appointments. T-tests revealed no significant differences between subjects who agreed to participate and those who did not on baseline levels of denial, knowledge about STD/HIV transmission and risk, self-reports of sexual risk behaviors, and number of sexual partners. Subjects who agreed to participate were randomly assigned to either one of two experimental conditions or to a control condition. Forty-eight subjects participated in the control condition, 57 participated in the cognitive condition, and 45 participated in the motivation condition. Analyses of variance (ANOVAs) revealed no significant differences between subjects in the three conditions on baseline levels of denial, knowledge about STD/HIV transmission and risk, self-reports of sexual risk behaviors, and number of sexual partners. Subjects' ages ranged from 16 to 44 with a mean of 18.7 ($SD = 2.7$).

Procedures

This study was reviewed and approved by the institutional review board at the university where it was conducted. The experimental and control conditions were administered by four trained experimenters, two males and two females, who were blind to the purpose of the study. Subjects and experimenters were matched on sex. Thus, one male and one female experimenter ran subjects in the cognitive condition, while the others ran subjects in the motivation condition. All four experimenters ran subjects in the control condition.

Cognitive Condition: The purpose of this condition was to give subjects information about their peers' risk behaviors and make them aware of their own risk behaviors, relative to those of their peers. Subjects were told the purpose of the study was to understand how much college students know about their own and each others' risk for STDs/HIV. Subjects were given a one-page STD/HIV fact sheet about routes of transmission and prevalence of

STDs/HIV and were asked to read five questions about risk level for STDs/HIV. The questions included items such as: "Which percentage of time indicates how often you have sexual intercourse without a condom?" Responses could range from 0%–100% (never–always). Each question already had an arrow indicating a specific response, which corresponded to the answer of a typical student at the university of the subject's same sex. Based on this information, subjects were asked to answer each question, estimating the frequency of their risk behaviors.

Subjects then completed a dependent measures questionnaire assessing social desirability, denial, specific knowledge of STD/HIV, level of involvement in the study, and intent to use condoms in the future. These scales were completed by subjects in all conditions.

Motivational Condition: This condition intended to induce hypocrisy to reduce denial of STD/HIV risk. Subjects were asked to take a public stand on the importance of condom use (by appearing on a video tape) and then to consider their own past failures in condom use. They were told the purpose was to develop an STD/HIV prevention and education program for high school students:

"We feel a video tape of college students discussing STDs, HIV, and safe sex would be a good way to communicate the importance of safe sex to high school students. We would like you to prepare a short speech, not more than 2–3 minutes, about the importance of using condoms based on information about STDs/HIV which I will give you. Your speech doesn't need to be formal or perfect so don't worry about making mistakes."

After completing their presentations, subjects were given a list of 15 situations which hinder condom use and were asked to add any situations they have experienced to the list, as well as to indicate which of the situations had happened to them in the past. The list included items such as, "We forgot to buy condoms" and "It was the first time for me or my partner." This was intended to make subjects mindful of their past failures in condom use. They were told that this list would be helpful in understanding more about why condoms are difficult for most people to use. As in the cognitive condition, subjects completed a dependent measures questionnaire.

Control Condition: Subjects in the control condition met with the experimenter in groups of three and four and were told the purpose of the study was to examine whether there were any changes in students' attitudes or information about STDs/HIV since the first questionnaire. As in the other two conditions, subjects completed a dependent measures questionnaire.

Payment and Condom Purchase

After participating in one of the three conditions, all subjects met with the experimenter for payment and were offered the opportunity to purchase condoms. Subjects were paid \$3 and received one experimental credit for their participation. Subjects were told they could use part of the money they were paid for their participation in the study to purchase condoms. Simply offering condoms to subjects for free may have elicited the response of taking condoms merely because they were free of charge. Thus, it was necessary to provide subjects with the opportunity to obtain condoms at some cost, but not at a cost so great as to inhibit the purchase. Condoms were made available at the same price (10 cents each) as they were at the health center on campus, where

many students purchase condoms. Subjects were told that the experimenter had to leave to prepare for the next subject, but that they could stay and fill out a receipt for their payment (for departmental purposes). In addition, if they decided to purchase condoms, they should take as many packets as they like, leave the appropriate amount of money on the table, and make change for themselves from a bowl of change on the table.

Phone Interviews and Debriefing

Subjects were contacted by phone 2 months after completion of the experiment and were interviewed regarding their current sexual practices, as assessed by sexual risk questions included in the questionnaire at Time 1. They were also assessed for denial. At the end of the interview, subjects were thoroughly debriefed as to the full purpose of the study. Subjects in all conditions were told that the true purpose of the study was to examine which factors influence whether people will change their behaviors to become less risky. All subjects were given details about our hypotheses and all three conditions. Also, subjects in the motivational condition were told that they were not actually videotaped.

Scales

Social Desirability: Social desirability was assessed using a scale on the dependent measures questionnaire that was administered at Time 2, to control for possible bias in responding to personal questions about sexual behaviors dishonestly or in socially sanctioned ways. Reynold's (34) short form of the Marlowe-Crowne Social Desirability scale (35) is a 13-item scale which has been found to be a viable alternative to the full 33-item scale and has KR-20 of .74 (36).

Knowledge of STDs/HIV: Two assessments of knowledge were used. At Time 1, general knowledge of STD/HIV transmission was assessed to verify that there were no differences in level of knowledge between subjects in each condition. Knowledge of routes of transmission of STDs and HIV and effective preventive techniques were assessed using 17 true/false questions adapted from previous AIDS prevention literature (4-6). The questions were originally formulated for HIV transmission and prevention, so the wording was slightly changed for the 7 questions which refer to STDs. The 10 questions pertaining to HIV included the 7 STD questions and 3 additional questions regarding blood-to-blood contact of HIV transmission. Response categories were True, False, or Don't Know. A total knowledge score was calculated by summing the number of correct answers.

At Time 2, more specific facts about STDs/HIV were asked in the form of seven multiple choice questions. These questions were included in order to determine whether differences between conditions could be due to a simple learning effect as a result of the information presented in the experimental conditions. These questions were based on the STD/HIV fact sheet which was given to subjects at the beginning of the cognitive and motivation conditions. These questions included items such as, "How long does it take before the AIDS virus causes a person to develop the illnesses that cause death from AIDS?"

Sexual Risk Behaviors: Sexual behaviors were assessed at two time points, at baseline (Time 1) and during the phone call interviews (Time 3), to determine whether the experimental conditions were effective in reducing sexual risk behaviors over a 2-month period. At baseline, subjects were asked eight questions assessing whether they had engaged in a number of sexual behaviors (oral sex, vaginal intercourse, anal intercourse, with-

drawal) and the extent to which condoms had been used for these activities (always, sometimes, and never). For example, "Please indicate how frequently you have used a condom when having vaginal intercourse." These questions were a subset of, and were modeled after, those used by Moore and Rosenthal (37). Responses were coded so that high scores corresponded to high levels of risk behaviors. An overall sexual risk behavior score was obtained by summing all individual questions. At Time 3, subjects were asked shorter versions of these questions, adapted for a telephone interview format. Again, high scores corresponded to high levels of risk behaviors. An overall sexual risk behavior score was obtained by summing these items. The two overall sexual risk behavior scores were standardized to make them comparable and the standardized form was used in the analyses.

Denial: The extent to which subjects reasoned away or played down their risk of STDs and HIV was measured at all three time points to examine whether subjects were denying their level of risk and whether the experimental conditions effectively reduced this denial. The scale consisted of 16 self-report items (38). Subjects answered all items on a 5-point scale, where "1" indicated complete disagreement with the item and "5" indicated complete agreement. Examples of items include the following: "I won't get infected with HIV because that sort of thing never happens to me," and "The chance that I'll be infected with the virus is so small that I accept the risk." Subjects answered each item twice: once for risk of STDs and once for risk of HIV. These items have been shown to be reliable in assessing denial of HIV, yielding an r of .76 (38).

Intent to Use Condoms in the Future: At Time 2, subjects were asked to indicate on a scale of 0%-100%, "How frequently do you plan to use condoms in the future?"

Checks on the Manipulation: In order to determine whether the conditions differed in the amount of involvement they required, subjects were asked three questions: how interesting the information and tasks required of them were, how much the information grabbed their attention, and how engaging they found participating in the study. Questions were scored on a scale of 1-5, where low scores corresponded to little or no involvement.

RESULTS

Overview of Statistical Analyses

First, one-way ANOVAs on the manipulation checks were used to determine the effectiveness of the experimental conditions in eliciting subjects' involvement in the study and differences in levels of knowledge between conditions. Second, planned comparisons (t-tests) were conducted on the three primary dependent variables in the study (intent to use condoms, denial, and condom purchase) to determine whether the experimental conditions were more effective in changing denial and behaviors than the control condition and to examine differences between the two experimental conditions. Third, repeated measures ANOVAs were conducted to examine changes in denial and risk behaviors over time and across conditions.

Checks on the Manipulation

The three questions used to assess subjects' involvement in the study were highly correlated with each other ($r_s = .67, .61, .57, p < .0001$) and therefore were combined into a summary variable. To examine the effects of the manipulations on involvement in each of the three conditions, a one-way ANOVA using condition as the independent variable and the summary variable of involvement

TABLE 1
Means and Standard Deviations of Dependent Variables Within Each Condition

	Control Condition		Cognitive Condition		Motivation Condition	
	M	SD	M	SD	M	SD
Intent to use condoms	83.9 ^a	28.7	83.7 ^c	27.5	93.2 ^{a,c}	11.2
Reasoning away risk	42.7 ^b	14.2	42.4 ^d	13.5	39.1 ^{b,d}	12.5
Condoms purchased	2.5	5.3	1.8	3.5	2.2	3.0

^a and ^b indicate significant differences between control and motivation conditions, $p < .02$ and $p < .05$, respectively.

^c and ^d indicate significant differences between cognitive and motivation conditions, $p < .03$ and $p < .06$, respectively.

Note: The individual ranges of each of the scales included in the table are as follows: intent to use condoms, 0–100%; denial, 31–74; condoms purchased 0–30.

as the dependent variable was conducted. It was expected that for subjects in the motivation condition, levels of involvement would be highest when compared with the cognitive and control conditions. A significant main effect of condition was revealed, $F(2, 145) = 6.03, p < .003$. A least significant difference analysis indicated that subjects in the motivation condition reported significantly higher levels of involvement ($M = 10.6, SD = 2.2$) than subjects in the cognitive condition ($M = 9.1, SD = 2.4, p < .001$) and marginally higher levels of involvement than subjects in the control condition ($M = 9.8, SD = 1.9, p < .06$). The cognitive and control conditions did not differ significantly on level of involvement.

To determine whether differences in the independent measures could be due to the differences in levels of information given and knowledge acquired in the experimental conditions, a one-way ANOVA using condition as the independent variable and specific knowledge about STDs/HIV as the dependent variable was conducted. Results revealed that subjects in both of the experimental conditions reported equal levels of knowledge ($M = 6.4, SD_{cog} = .75, SD_{mot} = .71$), which were significantly higher than levels of knowledge reported in the control condition ($M = 5.9, SD = 1.1$), $F(2, 145) = 3.97, p < .02$. Thus, any differences between the experimental conditions could not be attributed to differences in knowledge acquired during the interventions about STDs/HIV.

Social desirability was not correlated with any of the variables in the study and t-tests by gender revealed no significant differences on any of the dependent variables.

Comparisons between the Experimental and Control Conditions

The motivation condition was expected to be more effective than the cognitive or control conditions in decreasing denial, eliciting intent to use condoms in the future, and increasing condom-purchasing behavior. T-tests revealed that motivation subjects reported marginally significant lower levels of denial than cognitive subjects, $t(101) = 1.54, p < .06$ and significantly lower levels than control subjects, $t(92) = 1.68, p < .05$ (see Table 1). Regarding intent to use condoms, subjects in the motivation condition reported significantly higher levels of intent to use condoms in the future than did subjects in the cognitive, $t(101) = 2.02, p < .03$ and control, $t(92) = 2.16, p < .02$ conditions. No

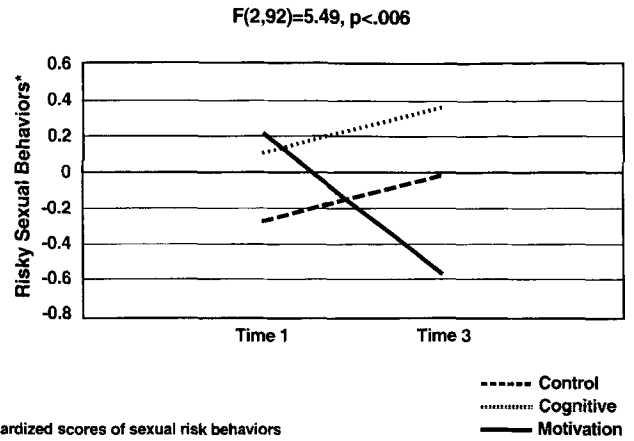


FIGURE 1: Changes in sexual risk behaviors over time, within each condition.

significant differences between conditions were found regarding condom-purchasing behaviors. Motivation condition subjects reported significantly greater intent to use condoms and lower levels of denial than subjects in the other two conditions.

Two-Month Follow-Up

The motivation condition was expected to produce longer-lasting effects in reducing sexual risk behaviors than the cognitive and control conditions. To examine differences in self-reported sexual risk behaviors across conditions over time (Times 1 to 3), a repeated measures ANOVA was conducted. A significant main effect of condition, $F(2, 92) = 3.2, p < .05$, and a significant interaction between condition and time of risk assessment was found, $F(2, 92) = 5.49, p < .006$. Means indicated that in the cognitive and control conditions, self-reported sexual risk behaviors increased slightly from baseline assessment at Time 1 to follow-up interviews at Time 3 (cognitive $M1 = .11, SD = 1, M3 = .37, SD = 1.1$; control $M1 = -.27, SD = 1, M3 = -.005, SD = .88$), though these increases were not statistically significant. Also, differences in self-reported sexual risk behaviors between the two conditions were not significant either. However, by contrast, subjects in the motivation condition showed a significant decrease in level of self-reported sexual risk from Time 1 to Time 3 ($M1 = .2, SD = 1, M3 = -.56, SD = .48$). Furthermore, self-reported sexual risk behaviors in the motivation condition were significantly lower than those in the cognitive ($p < .0001$) and control ($p < .03$) conditions at Time 3 (see Figure 1).

To ensure that the main effect of condition occurred at Time 3 and not at Time 1, two one-way ANOVAs were done: one using condition as the independent variable and self-reported sexual risk behaviors at Time 1 as the dependent variable, the other using condition as the independent variable and self-reported sexual risk behaviors at Time 3 as the dependent variable. No significant differences in number of self-reported sexual risk behaviors were found among the three conditions at Time 1. However, at Time 3, a significant difference between the three conditions was found, $F(2, 92) = 7.34, p < .001$. Examination of the means indicated that at Time 3, motivation condition subjects reported significantly fewer sexual risk behaviors ($M = -.56, SD = .48$) than control ($M = -.005, SD = .88$) and cognitive ($M = .37, SD = 1.1$) subjects.

Last, we examined differences in levels of denial over the three time points and across conditions using a repeated measures ANOVA. A main effect of time was observed, indicating that denial decreased within each condition at each of the three time

points. Denial was greatest at Time 1 ($M = 44.8$, $SD = 13.3$), decreased at Time 2 ($M = 41.5$, $SD = 10.5$), and was lowest at Time 3 ($M = 38.2$, $SD = 8.4$). In the motivation condition, denial decreased significantly from 44.9 at Time 1 to 35.9 at Time 3, $t(44) = 3.16$, $p < .05$. However, denial also decreased significantly in the cognitive condition from a mean of 45.5 to 38.2, $t(55) = 2.40$, $p < .05$. Denial in the control group did not decrease significantly, $t(47) = 1.78$, $p < .10$. This suggests that the main effect of time on denial was due to the decreases experienced in both of the experimental conditions.

Summary of Results

Overall, the subjects in the motivation condition reported significantly greater intent to use condoms in the future, lower levels of denial immediately after the intervention, and fewer risky sexual behaviors over time than subjects in the other two conditions. Both the motivational and cognitive conditions showed significant decreases in denial from Times 1 to 3.

DISCUSSION

The findings of the study support the primary hypothesis of this study, that the motivation condition, based on dissonance theory, would be more effective than the cognitive condition, a more informational approach, in decreasing denial immediately after the intervention and in increasing intent to use condoms in the future. These results are consistent with findings by Fisher and colleagues (39), which indicate that informational approaches had only mediated effects on preventive behavior, while motivational constructs had both direct and mediated effects on behavior. The motivation condition in our study did not, however, increase condom-purchasing behaviors, as it has in previous work (17). This is surprising given that the motivation condition was successful in changing the other dependent measures (intent to use condoms, denial, sexual risk behaviors over time). An important factor which may have influenced subjects' condom purchasing is lack of choice between brands/types of condoms available. In the previous study (17), subjects were given a choice between 14 brands of condoms, while in the present study subjects were only offered the brand available at the student health center.

The motivation condition did produce substantial effects on self-reported risky behavior which were sustained for 2 months beyond immediate postassessment. It significantly reduced denial over time as well. Denial also decreased significantly over time in the cognitive condition; however, in the motivation condition this decrease in denial was accompanied by a significant decrease in self-reported sexual risk behaviors, while in the cognitive condition it was not.

These results go beyond the previous work using a hypocrisy paradigm (16,17). This study not only replicates findings regarding risky behaviors and denial, it indicates that these changes appear to be lasting over a period of 2 months. Neither Aronson and colleagues (16) nor Stone and colleagues (17) found significant differences in levels of condom use between the hypocrisy and control conditions at the follow-up interview, probably due to small sample sizes (ns of 11–14). Therefore, the results presented here are particularly encouraging. Using significantly larger sample sizes (ns 24–39), substantial decreases in denial and, perhaps most importantly, significant decreases in self-reported risky behavior over time were found in the motivational condition using the hypocrisy paradigm. Further, this study suggests that inducing a strong level of personal involvement, as in the motivational

condition, is important if interventions are to produce behavior change.

In contrast, only limited support was revealed for the cognitive condition, which was based on changing unrealistic optimism. It appears that reducing cognitive errors through the cognitive condition had no pervasive effect on changing either intentions or self-reports of actual behaviors. The only significant finding in this condition was on reducing denial over time. Thus, overall, the cognitive intervention does not seem to be as effective in eliciting self-reported behavior change. This is not surprising given that few studies have examined the relationship between unrealistic optimism and behavior. The only two studies which have examined this relationship report little or no relationship between unrealistic optimism and actual self-protective behaviors, none of which were in the area of sexual behavior (23,27). In fact, Weinstein and colleagues (27) have argued that when the threat has extraordinary consequences and is remote, such as in the case of HIV, increasing susceptibility will not be associated with increased health protective behaviors. One reason for the apparent ineffectiveness of the cognitive condition could be that by forcing individuals to confront their risk head-on, the condition has a demotivating effect. This is consistent with Leventhal's work on fear appeals (40), which suggests that messages that induce fear and discomfort may immobilize individuals from taking appropriate preventive actions unless they are paired with educational prevention information. In this study, the demotivating effect is illustrated by the finding that subjects in the cognitive condition reported the lowest levels of involvement when compared to subjects in both the motivation and control conditions.

Last, in the cognitive condition, no reductions in self-reported sexual risk behaviors over time were found, despite decreases in denial. This is consistent with previous findings which indicate that adolescent girls who are higher in optimism are less likely to take risk-reducing actions (41). This further underscores the fact that attitudinal change is not consistently related to behavior change. It may be that in contrast to motivational approaches, cognitive interventions are not sufficient to change both attitudes and related risky sexual behaviors. This is consistent with our expectation that since attitude change in the motivational condition was motivated internally by a state of dissonance, it would be more powerful than if it had been externally motivated, as in the cognitive condition. The lasting attitudinal and self-reported behavior changes evident in the motivation condition appear to be due to the dissonance reduction process at the heart of the motivational approach.

While it could be argued that the differences between the motivation condition and the other two conditions may be due to differences in knowledge acquired in the three conditions, this does not seem to be the case. For example, our conditions may be viewed as simply varying levels of information about STDs/HIV given to subjects. It is true that subjects in the motivation and cognitive conditions received more information about STDs/HIV transmission and risk behaviors than subjects in the control condition. Indeed, subjects in both of the experimental conditions reported equal levels of knowledge, which were significantly higher than levels of knowledge reported in the control condition. However, despite equal levels of knowledge in the motivation and cognitive groups, only subjects in the motivation condition exhibited lasting changes in reports of risky behaviors. Therefore, these changes cannot be due to a simple learning effect.

The limitations of this study should be acknowledged. The main findings of our study come from self-reports of sexual behavior. This is the usual method of assessing sexual behavior

(12,16,17,42,43); however, it would be helpful to have a more objective measure of sexual behavior, such as an STD incidence. This would require a much larger sample size and a slightly different study design, most probably using a sample from a clinic population. These findings are not generalizable to other populations. While previous work has found the hypocrisy paradigm to be effective cross-culturally with minority subjects (44), whether such findings would be replicated in a higher risk population needs to be examined further. Still, inner city clinic populations or sexually active HIV-positive individuals may benefit from such interventions. Finally, while the motivational condition includes both an informational and motivational component, it lacks a component aimed at increasing subjects behavioral skills for performing preventive behaviors. Evidence indicates that a three-factor model of AIDS-preventive behavior, including information, motivation, and behavioral skills, is most effective in increasing preventive behaviors in various populations (39,45). While our study is consistent with Fisher and colleagues' (39,45) work and in fact goes beyond it by providing experimental evidence of the relative greater importance of motivation over information in the IBM model, adding a behavioral skills component to the motivational condition may indeed improve the effectiveness of this condition.

In conclusion, the results reported here are very encouraging. They lend strong support for both the temporary and long-lasting impact which dissonance-based interventions have on intent to change behavior, adoption of self-protective behaviors, and denial. These findings suggest that social psychological approaches, such as dissonance induction, may be effective and efficient in eliciting lasting risk behavior change, as measured by self-reports. Overall, the success of innovative interventions such as the motivational condition is particularly important because it can easily be applied to a number of risky behaviors, including drinking and driving, smoking cessation, drug use, overeating, sun-bathing practices, and exercise adoption, among others.

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