



Efficacy of the Theory of Reasoned Action in Predicting AIDS-Related Sexual Risk Reduction Among Gay Men¹

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This study evaluates the utility of a social psychological theory, Ajzen and Fishbein's (1980) Theory of Reasoned Action, in explicating attitude-behavior relationships concerning the practice of "safer sex" in a sample of 297 gay men. As the theory predicts, results indicate that a positive attitude toward "safer sex" and a belief that important, influential referents encouraged such behavior covaried with intention to practice sexual behaviors that minimize risk of infection with Human Immunodeficiency Virus (HIV). In turn, intention predicted levels of sexual risk-taking and employment of HIV-risk reducing strategies. Results provide support for the theory of reasoned action as a viable model of attitude-behavior relationships in AIDS-related risk reduction behaviors of gay men.

Over the last decade, Acquired Immunodeficiency Syndrome (AIDS) emerged in the United States as a major, new public health problem. Among adults at highest risk for infection with the Human Immunodeficiency Virus (HIV) are sexual partners of HIV-infected individuals, many of whom are gay and bisexual males (Centers for Disease Control, 1989). For gay men, public health recommendations target the promotion of risk-reducing sexual behaviors that eliminate or minimize exposure to HIV-contaminated bodily

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fluids (blood and semen) through using condoms or abstaining from behaviors, such as anal intercourse, that appear to readily facilitate HIV transmission (Friedland & Klein, 1987). These recommendations have come to be called "safer sex."

Many gay men have profoundly altered their sexual behavior to reduce the risk of HIV infection, both for themselves and others (Becker & Joseph, 1988; Martin, Garcia, & Beatrice, 1989; McCusker, Zapka, Stoddard, & Mayer, 1989; Siegel, Mesagno, Chen, & Christ, 1989). However, it is apparent that the extensive behavior change that has occurred has neither been universal nor necessarily stable (Stall, Ekstrand, Pollack, & Coates, 1990; St. Lawrence, Hood, Brasfield, & Kelly, 1989). In this context, achieving an understanding of the psychological determinants of risk-reducing behaviors may be critical to the development of much needed effective preventive interventions.

Early in the epidemic most research on behavior change was primarily descriptive in nature with sometimes contradictory findings. Focusing solely on intrapsychic factors, evidence was found for a negative association between the following and HIV risk reduction: enhanced sense of personal risk (Joseph, Montgomery, Emmons, Kirscht, et al., 1987) and conversely an underestimation (Valdiserri et al., 1988) or denial of risk (Coates et al., 1987), a belief that one has successfully fought off the AIDS virus (McKusick et al., 1985) or is not vulnerable to AIDS (Klein et al., 1987), a lack of belief in one's personal efficacy to make the recommended changes (McKusick et al., 1985; Siegel et al., 1989) or viewing such changes as difficult (Siegel et al., 1989), and normative beliefs that other gay men do not support the practice of "safer sex" (Joseph, Montgomery, Emmons, Kessler, et al., 1987).

As yet, few researchers have attempted to explore theoretically driven models of HIV-related behavior changes (O'Keefe, Nesselhof-Kendall, & Baum, 1990). Initial attempts employed the Health Belief Model (Kirscht & Joseph, 1989) with only limited success (Allard, 1989; McCusker et al., 1989; Montgomery et al., 1989). Other approaches relating psychological constructs to behavior have also been proposed as models for AIDS risk reduction (Bandura, 1990; Catania, Kegeles, & Coates, 1990). Extremely promising, given its successful implementation in other behavior domains, is the Theory of Reasoned Action (TRA; Fishbein & Middlestadt, 1989).

The TRA hypothesizes that attitudes and beliefs affect behavior primarily through their shaping of behavioral intentions, which are the proximal determinants of people's actions. These intentions are a function of two factors, behavioral attitudes and social influence. Behavioral attitudes toward the activity in question represent the individual's positive or negative evaluative and affective judgments about performing the specific behavior.

These attitudes, in turn, are shaped by behavioral beliefs about the personal consequences of engaging in the behavior in question as modified by their value to the individual.

According to the TRA, behavioral intentions are also influenced by people's perceptions of social pressures to perform the behavior in question. Normative beliefs, beliefs that important referents want the individual to engage in the behavior, weighted by one's motivation to comply with these desires, determine the subjective norm, or the global perception of social influence to enact the behavior. In turn, the subjective norm functions as a direct influence on behavioral intention. Thus, individuals who believe that important referents in their environment support risk-reducing behaviors may have stronger intentions to practice such behaviors. The relative weighting of behavioral attitude and the subjective norm will ultimately determine whether an individual intends to engage in sexual risk reduction.

The TRA assumes that people are rational beings who systematically utilize available information to shape their volitional actions in the world (Tesser & Shaffer, 1990). Previous research supports the TRA's predictive utility in attitude-behavior relationships in a variety of human behavior domains (Sheppard, Hartwick, & Warshaw, 1988), including preventive health behaviors (Brubaker & Loftin, 1987; Horne, McDermott, & Gold, 1986; Lierman, Young, Kasprzyk, & Benoliel, 1990; Timko, 1987; Valois, Desharnais, & Godin, 1988).

Applying the TRA to predicting the enactment of risk-reducing sexual behaviors, however, is complicated by the complexity of the term "safer" sex. The practice of lower-risk sexual activities can involve a number of different, and not necessarily correlated, strategies including the use of condoms, limiting the number of sexual partners, having sex with others who are known to be uninfected with HIV, and avoidance of specific risky sexual activities, such as anal intercourse (Friedland & Klein, 1987). Although all of these fall under the rubric of "safer" sex, some are aimed at limiting possible exposure to HIV through reducing risk generated by partner-based characteristics, such as number of contacts or contact with partners who might themselves be at higher risk for HIV infection. Other risk-reducing behaviors focus specifically on limiting possible exposure to HIV-infected bodily fluids (through lower risk behaviors such as mutual masturbation or using condoms) irrespective of the number of different sexual partners.

There is evidence to believe that these two strategies may be somewhat independent. Siegel, Bauman, Christ, and Krown (1988) found in a study of sexual behavior changes by gay men in New York City that the occurrence of sex with multiple partners was not invariably linked to the practice of risky sexual behaviors. Nearly half of the men they surveyed with multiple partners also reported practicing only lower-risk sexual behaviors. In addi-

tion, results (Winkelstein et al., 1987) from a second sample of gay men from San Francisco indicate that men may be more likely to practice higher risk sex with their primary partners than with strangers. These previous findings support a two-dimensional conceptualization of "safer" sex, with one reflecting a partner exposure dimension and the other the riskiness of actual behavioral practices.

As noted by Becker and Joseph (1988), in a specific population such as urbanized gay men where prevalence rates of HIV infection are high, both partner choice and sexual practices are important factors in slowing HIV transmission. Thus, for the TRA to serve as an adequate social psychological model of sexual risk reduction, it must predict both aspects of "safer" sex, partner exposure and actual sexual behavior.

The present study evaluates the utility of the TRA model to account for attitude-behavior relationships in a sample of urban gay men who completed anonymous questionnaires prior to participating in an AIDS education workshop conducted by a community service AIDS organization. In Figure 1, we present a schematic depiction of the theory of reasoned action model evaluated via structural equation modeling procedures (Bentler, 1989). As shown, we hypothesize that behavioral and normative beliefs influence, respectively, gay men's reported attitude and subjective norm concerning lower risk sexual behavior practices. In turn, participants' attitude and subject norm are depicted as causes of self-reported behavioral intention. Intention is then postulated as influential on sexual risk reduction behaviors. We also hypothesize that intention to practice safer sex is "causal" for both partner exposure in the previous 30 days and the enactment of risk reducing behaviors. Because the data are correlational, the direction of causality indicated in the figure is assumed, but untestable.

The figure also depicts two additional paths not specifically predicted by the TRA, one linking behavioral beliefs and the subjective norm and the other normative beliefs and attitude. The occurrence of unanticipated construct intercorrelations has been previously observed empirically in several other TRA-based studies (Bentler & Speckart, 1981; Cochran & Gitlin, 1988; Lierman et al., 1990; Montano, 1986; Timko, 1987) although some researchers (De Vries, Dijkstra, & Kuhlman, 1988; Fredricks & Dossett, 1983; Valois et al., 1988), have not replicated these relationships. Structural equation modeling procedures allow for estimating these possible associations while testing for the theory's comprehensive ability to account for attitude-behavior relationships (Bentler, 1989).

Method

Participants

Participants consisted of 297 self-identified gay men who completed questionnaires, described below, prior to participating in an AIDS education

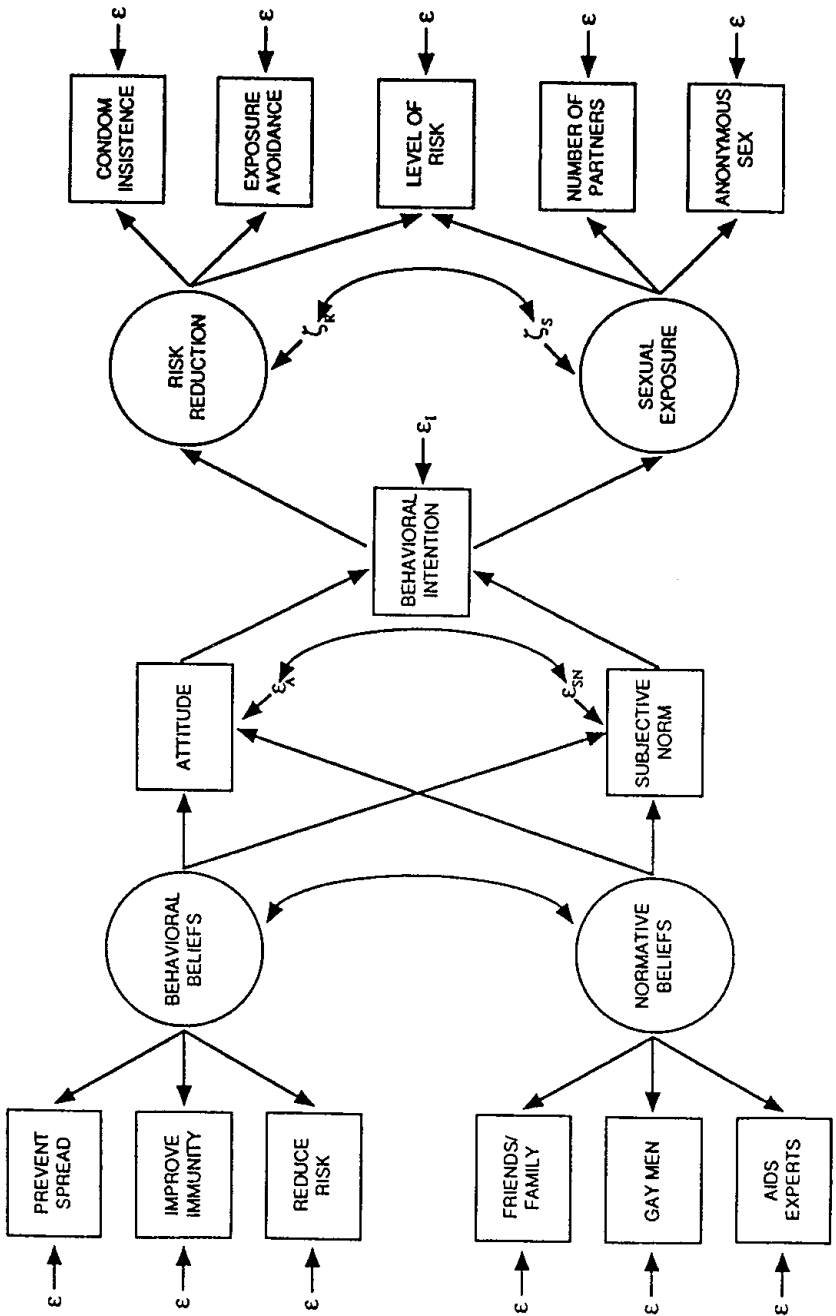


Figure 1. Theory of Reasoned Action model of AIDS-related sexual risk reduction.

workshop. The men ranged in age from 18 to 69 years old with a median age of 34 years ($\bar{X} = 35.8$ years, $SD = 10.3$). The majority of men were Caucasian (82%) with the balance reporting Hispanic (5%), Black (2%), American Indian (2%), or Asian (4%) ethnic minority backgrounds. By self-report, 43 men (14%) were seropositive to HIV antibodies, 59 (20%) were seronegative, and 185 men (62%) had never been tested. Four men (1%) reported having been tested but did not obtain their results and 6 men (2%) refused to answer the question. Only 11 men reported having been diagnosed with HIV-related disease by their physician.

Procedure

A total of 433 men who attended a Shanti Foundation Special Health Education Program seminar were asked to participate in the study. These 3-1/2-hour evening seminars were offered free of charge to the public as a method of disseminating information regarding AIDS and AIDS risk reduction. Men were told in advance that they would be asked to complete anonymous questionnaires, but could decline to do so without penalty. The cover sheet to the questionnaire provided an informed consent and assurances of confidentiality, including articulation that no one at the AIDS services agency would have access to their questionnaires. Eighty-two percent (355) of the men agreed to participate. Data from 25 self-labeled heterosexual and bisexual men were excluded from the study. Of the remaining 330 participants, questionnaires from 33 men were also excluded due to missing data.

Questionnaire

Participants completed a 17-page questionnaire. The survey included sections assessing current sexual behavior, psychosocial aspects of coping with AIDS, and levels of psychological distress. The instrument required about 20 minutes to complete and included:

Theory of Reasoned Action questionnaire. Participants were first asked by one 7-point item, ranging from *extremely unlikely* to *extremely likely*, their *Behavioral Intention* to "follow *exactly* safer sex guidelines in all of (their) sexual activities." Although participants were not specifically given a definition of "safer" sex guidelines, another section of the questionnaire which assessed knowledge of sexual risks indicated that participants knew the relative riskiness of different sexual risk behaviors. Men were asked to rate on 5-point items ranging from 1 (*not dangerous*) to 5 (*extremely dangerous*) the risk of 18 sexual behaviors. Both rankings of the behaviors and mean scores on the items demonstrated a clear awareness that some behaviors such as

mutual masturbation carry little or no risk ($\bar{X} = 1.2, SD = .4$), some such as anal intercourse with ejaculation are associated with high levels of risk ($\bar{X} = 4.9, SD = .4$), and others such as anal sex with condoms lie somewhere in between ($\bar{X} = 2.5, SD = 1.0$). Observed rankings were consistent with safer sex guidelines in place at the time of the study.

Next, men rated their *Behavioral Attitude* toward practicing safer sex on three dimensions: good-bad, wise-foolish, and harmful-beneficial. Scoring of the third item was reversed and the three items were averaged to generate one score.

Participants then responded to items assessing *Behavioral Beliefs* about three dimensions: practicing safer sex will prevent the spread of AIDS, improve immune functioning, and reduce the risk of getting AIDS. To measure each belief, participants first rated the value (good-bad) of their "preventing the spread of AIDS," "improving [their] immune functioning," and "reducing [their] risk for getting AIDS." Next they indicated the likelihood that their practicing safer sex would achieve these outcomes. Following the procedures of Ajzen and Fishbein (1980), we multiplied the evaluative item, ranging from a +3 to a -3, by the expectancy, also ranging from +3 to -3, to calculate a weighting for each of the three beliefs.

Then, participants responded to a single 7-point item indexing the *Subjective Norm* ("Most people who are important to me think I should practice safer sex."). We also measured three *Normative Beliefs* related to encouragement to practice safer sex from other gay men, friends and family, and AIDS experts. These three normative beliefs were measured by 7-point items indicating how *likely* or *unlikely* it was that these three targets wanted the participant to practice safer sex (e.g., "Most gay men think I should practice safer sex."). Because, overall, respondents tended to report it either totally likely or totally unlikely that these targets endorsed safer sex, items were scored as either +1 (in the likely direction), 0 (neither), or -1 (in the unlikely direction) to indicate either a positive, neutral, or negative valence. Next, participants were asked to indicate on 7-point items how *likely* (+7) or *unlikely* (-7) it was that they wanted to comply with the wishes of these other people (e.g., "Generally speaking, I want to do what most gay men think I should do."). We calculated the normative belief for each of the three classes of people by multiplying the perceived belief by the motivation to comply. This indexes both the direction and strength of the normative belief as an influence on behavior.

Sexual behavior. Participants were asked to indicate the number of sexual partners they had had sexual contact with in the previous 30 days. In the current sample, 28% of the men reported no sexual partners in the previous 30 days. Forty percent had had sexual contact with one man only, 13% with two men, and 19% with more than two (range = 3 to 35 men).

Men were also asked if they had had sexual contact with anonymous partners in the previous 30 days. Twenty-nine percent of the sample reported that they had.

To index level of risk, men were asked to indicate the frequency with which they had engaged in 15 different sexual behaviors with other men in the previous 30 days. We classified men as engaging in high-risk sexual activities if they reported one or more instances of oral sex without using a condom and with semen contact, unprotected anal intercourse with or without exchange of semen, oral-anal sex ("rimming"), or hand-anal sex ("fisting").³ Men who had not reported high-risk activities but did report one or more instances of deep french kissing, unprotected oral sex without exchange of semen, "water sports" (urinating on partner), or sharing sex toys with a partner we classified as possibly unsafe. For those who reported neither high-risk or possibly unsafe behaviors but did report one or more instances of mutual masturbation, oral sex with a condom, anal intercourse with a condom, and "safer" sex with an HIV positive individual, we labeled as possibly safe. Men were classified as completely safe if they had not been sexually active in the previous 30 days. Following this classification scheme, 34% were classified as having engaged in unsafe sexual behavior, 30% in possibly unsafe behavior, 7% in possibly safe behavior, and 28% in completely safe behavior.

Enactment of risk reduction guidelines. Virtually all participants (95%) reported that they had changed their behavior to reduce their risk of developing AIDS. Men were then asked to indicate the frequency with which they had adopted six possible safer sex behaviors on 3-point ordinal scales (never, sometimes, always). These behaviors included insisting on using condoms during sex, asking one's partner to use condoms, avoiding engaging in oral sex without condoms, avoiding anal sex without condoms, avoiding anal sex completely, and avoiding all contact with semen. These six items were factor analyzed. Maximum likelihood factoring suggested the presence of two factors accounting for 66% of the variance. The factors were then rotated by the Varimax procedure. The first factor indexed the use of condoms during sex and included four items loading above .35: insisting on using condoms, asking one's partner to use condoms, avoiding oral sex without condoms, avoiding anal sex without condoms. We labeled this Condom Use (Cronbach's $\alpha = .79$). The second factor tapped an avoidance response to higher risk sexual activities: avoiding oral sex without condoms, avoiding anal sex without condoms, avoiding anal sex even with condoms, avoiding all contact

³ Although definitions of exactly what constitutes safer sexual behavior, that is, behavior that will not transmit HIV should it be present, have varied over the last several years, we chose to use standards provided in AIDS education workshops at the time that men were assessed.

with semen (all items loading above .35). We called this factor, Avoidance of HIV Exposure (Cronbach's $\alpha = .59$). We then summed the four items for both scales to create two summarized scores reflecting frequency of insistence on condom use and HIV exposure avoidance.

Data Analysis

With the aid of the EQS computer program (Bentler, 1989), we tested hypotheses using simultaneous elliptical reweighted generalized least-squares estimates of path-analytic models (see Bentler, 1989; Bentler & Bonett, 1980; Bollen, 1989, for reviews). In order to minimize possible violations in the assumption of homogeneity of univariate kurtosis (Bentler, 1989), appropriate transformations (Tabachnick & Fidell, 1989) of the measured variables were utilized where distributions warranted. The structural equation modeling procedure evaluates the ability of theoretically predicted relationships among constructs to reproduce what is empirically observed. This is done by translating theoretical predictions into linear regression equations. For example, the TRA proposes that the attitudinal disposition (A) influences one's intention (I) to engage in a behavior ($I = \beta A + \epsilon$, where β equals a regression weighting of the attitudinal rating and ϵ represents unique variance, or measurement error). Thus, one can estimate the variance of the behavioral intention item from knowledge of the attitudinal rating. To the extent that the estimate closely approximates the actual variance of the item as observed, then the theoretical prediction is supported.

Within these procedures, variables are divided into those that are actually measured (depicted as boxes in Figure 1) and those that inferred (latent constructs depicted as circles). Additionally, procedures estimate residual variance or measurement error (depicted as ϵ or ζ in the figure). This approach combines the use of measurement models, as in factor analysis, with linear regression procedures (Bentler, 1989).

These hypothesized equations are solved simultaneously generating an estimated covariance matrix for the measured variables in the study. The estimated matrix is then compared to the actual matrix. A perfect correspondence between theory and study measurements would result in a χ^2 statistic of zero (Bollen, 1989). As sample size influences the outcome of this process, fit indices evaluating the adequacy of the estimated matrix to account for covariance within the observed matrix are also calculated (Bentler, 1989; Bentler & Bonett, 1980). We report results of three fit indices, ρ (a nonnormed index ranging from 0 to approximately 1), Δ (a normed index ranging from 0 to 1), and a Comparative Fit Index (CFI) (ranging from 0 to 1). Each estimates the amount of variance accounted for by the solution using different methods. Values of .9 or greater indicate an adequate fit (Bentler, 1989).

The significance of individual parameter estimates in the model is evaluated by critical ratio tests ($C.R. = \theta/S.E. > 1.96$). Values less than the critical ratio suggest that the relevant parameter is nonessential to the solution. Estimates reflect independent relationships of one construct with another.

Results

Indexing Risk Reduction Behaviors

The five measures of sexual behavior and risk reduction (number of partners in previous 30 days, participation in anonymous sex, level of sexual risk, condom use, and avoidance of HIV exposure) were first factor analyzed using maximum likelihood procedures and the solution rotated by the Varimax procedure. As expected, two separate factors emerged (see Table 1) accounting for 66% of the variance. The first factor indexed sexual risk exposure including number of sexual partners, level of behavioral risk, and the reporting of anonymous sexual partners. The second factor tapped enactment of risk reduction activities including avoidance of exposure to HIV-infected bodily fluids, insistence on using condoms and lower levels of behavioral risk.

Intercorrelations of Measured Variables

Zero-order intercorrelations of the measured variables are given in Table 2. These correlations demonstrate at a univariate level predicted theoretical

Table 1

Rotated Factor Loadings of Risk-Related Sexual Behaviors

	Sexual exposure	Risk reduction
Number of sex partners in past 30 days	.99	-.06
Level of sexual risk	.53	-.37
Sex with anonymous partner in past 30 days	.61	-.03
Avoidance of HIV exposure	-.08	.92
Insistence on condom use	-.10	.79

Note. Factors were extracted by maximum likelihood and rotated by the Varimax procedure. $N = 297$.

Table 2
Intercorrelations of Measured Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Behavioral Beliefs</i>													
1. Prevent spread	—												
2. Improve immune status	.21*	—											
3. Reduce risk	.58*	.19*	—										
4. Attitude	.49*	.20*	.50*	—									
<i>Normative Beliefs</i>													
5. AIDS experts	.01	.02	-.01	-.06	—								
6. Gay men	.11	.00	.01	.00	.56*	—							
7. Family/friends	.07	.08	.11	.07	.71*	.51*	—						
8. Subjective Norm	.30*	.11	.29*	.24*	.09	.25*	.28*	—					
9. Intention	.38*	.23*	.28*	.36*	.02	-.02	.10	.22*	—				
<i>Sexual Behavior</i>													
10. Condom use	.19*	-.04	.13	.24*	.03	.16	.14	.22*	.31*	—			
11. Avoidance of HIV exposure	.21*	.07	.12	.21*	.10	.17	.13	.10	.35*	.73*	—		
12. Level of risk	-.13	.06	-.07	-.17	-.04	-.03	-.06	.03	-.19*	-.35*	-.38*	—	
13. Number of sex partners	-.12	-.05	-.10	-.11	-.04	-.02	-.06	.12	-.19*	-.15	-.14	.55*	—
14. Anonymous partners	-.12	-.02	-.16	-.10	.01	.03	-.01	.06	-.20*	-.10	-.07	.32*	.61*

Note. $N = 297$.

* $p < .001$.

relationships. Consistent with the TRA, behavioral beliefs showed significant positive associations with the attitudinal measure. Two of these three behavioral beliefs and the behavioral attitude also demonstrated significant positive correlations with the subjective norm. All three behavioral beliefs and the attitude variable were positively and significantly associated with intention to practice safer sex.

Normative beliefs, for the most part, displayed predicted significant positive associations with the subjective norm, but not with any other construct. In turn, the subjective norm was positively associated with behavioral intention.

As theorized by the TRA, behavioral intentions to practice lower risk sexual behavior significantly correlated in the expected directions with all five sexual behavior measures. In addition, the behavioral belief that practicing safer sex would prevent the spread of AIDS and a positive attitude toward practicing safer sex showed a significant association with a greater insistence on condom use and avoidance of unsafe sexual practices.

Few differences were observed in either TRA constructs or sexual behavior among men who reported that they were HIV-infected, HIV-seronegative, or untested. When differences were evaluated by Newman-Keuls post-hoc tests, HIV-infected men, in contrast to HIV-negative or untested men, were significantly less likely to believe that practicing safer sex would reduce their risk of getting AIDS ($F(2,288) = 5.57, p < .01$). HIV-infected men also reported significantly more normative pressure from AIDS experts to practice safer sex than the other two groups ($F(2,288) = 4.15, p < .05$).

Evaluation of Theory of Reasoned Action

Univariate analyses fail to explore either the independent effects of theoretical concepts as predicted by the model (with the effects of shared variance removed) or the overall ability of the model to account for complex relationships among concepts. For that reason, structural equation modeling procedures were used.

Adequacy of the model depicted in Figure 1 was evaluated via the EQS computer program (Bentler, 1989). As shown in the figure, variables at similar points in the evaluation process were allowed to covary (e.g., behavioral beliefs and normative beliefs) as well as function as predictors of TRA concepts. Although the χ^2 failed to achieve nonsignificance, $\chi^2(68) = 127.39, p < .001$, the fit indices suggest that an adequate fit (Bentler, 1989) was obtained, $\Delta = .91, \rho = .94, CFI = .95$, with somewhere between 91% and 95% of the variance in measured variables accounted for by the hypothesized relationships.

Nevertheless, the Lagrange Multiplier Test (Bentler, 1989) suggested a

significant relationship between the sexual exposure latent variable and the subjective norm. Estimation of this parameter significantly improved the fit of the model as evaluated by a χ^2 difference test, $\chi^2(1) = 10.76, p < .001$, testing for the gain in variance accounted for by the second model over the first. This latter model also failed to achieve nonsignificance, $\chi^2(67) = 116.63, p < .001$, but again fit indices were within an acceptable range, $\Delta = .91, \rho = .95, CFI = .96$, suggesting excellent fit was obtained by the procedure. Parameter estimates derived from the modification of Figure 1 (by allowing a "causal" path from sexual exposure to subjective norm) for the measurement models are given in Table 3 and for the structural equations in Table 4.

Consistent with theoretical predictions, critical ratio tests of the parameter estimates indicate that behavioral beliefs significantly predicted gay men's attitudes toward practicing safer sex and normative beliefs predicted the subjective norm. In turn, both attitude and subjective norm positively predicted intention to practice safer sex. And finally, intention positively predicted enactment of risk reduction behaviors and lower levels of sexual exposure. In addition to these specific predictions from the TRA model, behavioral beliefs demonstrated a significantly positive association with the subjective norm. Also, level of sexual exposure showed a positive direct relationship with the subjective norm in that greater sexual exposure covaried with higher levels of normative influence to practice safer sex.

Further post-hoc analyses allowing the two latent behavior factors either singly or together to predict men's attitude and/or subjective norm, with the exception of the analysis just described, did not significantly improve the fit of the model when evaluated by χ^2 difference tests. Specifically, freely estimating a relationship between sexual exposure and attitude in addition to modification of Figure 1 above did not result in a significantly improved fit, $\chi^2(1) = .01, p > .10$. Also, estimating possible associations between the risk reduction latent variable and the subjective norm and attitude did not enhance the modified model, $\chi^2(3) = 1.14, p > .10$. Critical ratio tests of the additionally estimated parameters did not achieve significance, suggesting that these paths were nonessential to the model.

Discussion

Results of the current study underscore the complexity of gay men's responses to the threat of AIDS. Using the framework of the Theory of Reasoned Action and structural equation modeling methodology, we explored relationships among beliefs, attitudes, normative influences, behavioral intentions, and sexual behavior. As predicted from the theory, both attitudes toward safer sex and beliefs that important referents expected the individual

Table 3

Parameter Estimates for Measurement Models in Figure 1 With Sexual Exposure Affecting Subjective Norm Estimated

	Unstandardized estimates		Standardized estimates	
	Factor loadings	Error variances	Factor loadings	Error variances
<i>Behavioral Beliefs</i>				
Prevent spread	$\lambda_1 : 1.00$	.05 (.01)*	.76	.65
Improve immune functioning	$\lambda_2 : 1.09 (.29)^*$	.92 (.09)*	.27	.96
Reduce risk	$\lambda_3 : 1.01 (.11)^*$	.05 (.01)*	.76	.65
<i>Normative Beliefs</i>				
Friends/family	$\lambda_4 : 1.00$	2.33 (.44)*	.84	.54
Gay men	$\lambda_5 : .88 (.09)^*$	6.09 (.65)*	.64	.76
AIDS experts	$\lambda_6 : .76 (.07)^*$	1.29 (.25)*	.84	.54
<i>Risk Reduction</i>				
Avoidance of HIV exposure	$\lambda_7 : 1.00$	.05 (.02)*	.91	.40
Condom insistence	$\lambda_8 : .98 (.10)^*$	.14 (.03)*	.80	.60
Level of risk	$\lambda_9 : -.79 (.14)^*$	.86 (.09)*	-.34	.76
<i>Sexual Exposure</i>				
Level of risk	$\lambda_{10} : 1.00$		.50	
Number of partners	$\lambda_{11} : 2.79 (.42)^*$	.01 (.30)	1.00	.07
Anonymous sex partners	$\lambda_{12} : .46 (.06)^*$	.13 (.02)*	.62	.79

Note. Numbers in parentheses are standard errors of the parameter estimate.

*Critical ratio > 1.96.

Table 4

Parameter Estimates for Structural Equations in Figure 1 With Sexual Exposure Affecting Subjective Norm Estimated

	Unstandardized estimates	Standardized estimates
Variances and residual variances		
Φ_B : Behavioral Beliefs	.06 (.01)*	1.00
Φ_N : Normative Beliefs	5.51 (.79)*	1.00
ϵ_A : Attitude	.04 (.00)*	.76
ϵ_{SN} : Subjective Norm	.06 (.01)*	.87
ϵ_I : Intention	.04 (.00)*	.92
ζ_R : Risk Reduction	.24 (.04)*	.92
ζ_S : Sexual Exposure	.35 (.09)*	.98
Covariances		
$\Phi_{B/N}$: Behavioral Beliefs/Normative Beliefs	.05 (.05)	.08
$\epsilon_{A/SN}$: Attitude/Subjective Norm	-.00 (.00)	-.01
$\zeta_{R/S}$: Risk Reduction/Sexual Exposure	-.03 (.02)	-.10
Regression estimates		
β_{BA} : Behavioral Beliefs \rightarrow Attitude	.68 (.08)*	.66
β_{NA} : Normative Beliefs \rightarrow Attitude	-.00 (.01)	-.05
β_{BSN} : Behavioral Beliefs \rightarrow Subjective Norm	.45 (.08)*	.41
β_{NSN} : Normative Beliefs \rightarrow Subjective Norm	.02 (.01)*	.22
β_{AI} : Attitudes \rightarrow Intention	.25 (.05)*	.32
β_{NI} : Norms \rightarrow Intention	.14 (.05)*	.19
β_{IS} : Intention \rightarrow Sexual Exposure	-.68 (.22)*	-.23
β_{RS} : Intention \rightarrow Risk Reduction	1.01 (.17)*	.39
β_{NS} : Sexual Exposure \rightarrow Subjective Norm	.10 (.03)*	.21

Note. Numbers in parentheses are standard errors of the parameter estimate.

*Critical ratio > 1.96 .

to practice safer sex successfully predicted intention to do so. This intention was then significantly related to men's most recent safer sexual practices, including an index of partner exposure and another tapping the use of lower HIV-risk sexual behaviors in the previous 30 days. Results provide empirical support for the theory of reasoned action as an attitude-behavior model of HIV sexual risk reduction in gay men. Findings also present important implications for the development of AIDS prevention programs.

Initial AIDS prevention efforts targeted at gay men were informational centering on educational messages underscoring the threat of AIDS and behavioral practices likely to transmit HIV (O'Keefe et al., 1990; Siegel, Grodsky, & Herman, 1986). However, the extensive research that has been done to date on HIV-related risk behavior has failed to demonstrate that lack of knowledge is the principal factor in unsafe sexual behaviors (Becker & Joseph, 1988; Joseph, Montgomery, Emmons, Kessler, et al., 1987; McCusker et al., 1989; Siegel et al., 1988). There is emerging evidence that intrapsychic factors, such as perceptions of risk (Allard, 1989; Coates et al., 1987; Cochran & Peplau, 1991; Joseph, Montgomery, Emmons, Kessler, et al., 1987; McCusker et al., 1989; Valdiserri et al., 1988) and normative expectations (Joseph, Montgomery, Emmons, Kessler, et al., 1987) do influence the practice of risk-reducing sexual behaviors. Our findings provide further support that the influence of these factors are predictable from current social psychological models of attitude-behavior relationships. Future research could profit from exploring both the specific attitudes and beliefs most conducive to behavior change and its maintenance as well as influential factors that lead to the adoption of these attitudes and beliefs in the first place. The challenge is to discover the psychological dimensions of intention and motivation for behavior change that will endure over time.

Like others (Joseph, Montgomery, Emmons, Kessler, et al., 1987), our study also underscores the possible interaction of normative influences with sexual behavior. Structural equation modeling procedures suggested that greater levels of sexual exposure were significantly associated with perceptions of stronger normative influences to practice safer sex. Specifically, men who were sexually active with more partners and with men who were strangers to them were more likely to perceive that others expected them to practice safer sex. In contrast, no direct relationship was observed between attitudes toward safer sex and sexual behavior or normative pressures and the enactment of risk-reducing behaviors. This hints at the possibility that some aspects of men's sexual behavior, such as how many people one is having sex with, may be more likely to trigger normative pressures than the less accessible knowledge of whether an individual is potentially exposing himself to HIV with a particular partner. With mounting evidence that an important predictor of gay men's practicing safer sex is peer approval for

safer sex, it may also be important to explore methods by which to exert normative influence on behaviors that are less likely to result in scrutiny from peers.

A further issue here is determining the most effective application of normative pressures. Previous research suggests that normative influence works best when the source is viewed as credible and informative or the source has some attraction (Valdiserri, 1989). In the present study, we chose to focus on the influential pressures of family and friends, AIDS experts, and the gay male community at large. However, subsequent research may profit from a closer examination of this process. For example, general normative influences may conflict with immediate interpersonal pressure from a current sexual partner. Alternatively, research has yet to examine how normative beliefs influence individual actions when the person is sexually aroused or impaired from drug or alcohol ingestion. The latter has been shown repeatedly to function as a negative factor in risk reduction (Siegel et al., 1989; Stall, McKusick, Wiley, Coates, & Ostrow, 1986).

Finally, although the TRA is a predictive model, the current design allowed only an examination of its utility in accounting for recent sexual behavior. Further research is needed to demonstrate that it can, in fact, predict men's subsequent behavior. Also, our sample included predominantly white gay men, drawn from an urban location who provided self-report information about their sexual behavior. The validity of these self-reports may be problematic. Generalization of findings to other populations may necessitate careful examination of the appropriateness in operationalizing constructs, such as behavioral intention (Mays & Cochran, 1991; Mays & Jackson, 1991).

Nevertheless, the current study represents an important step in the direction of developing adequate models of HIV-risk reducing sexual behavior. As AIDS-related research becomes increasingly theoretically and methodologically sophisticated, solutions may emerge in the fight against AIDS (Kaplan, 1989; Mays & Jackson, 1991). Methodologies that provide scientists with the ability to focus on simultaneous contributions of several factors in behavior change may increase our effectiveness in designing prevention programs. Results of this study illustrate the usefulness of applying previously developed social psychological theories to the problem. As AIDS preventionists move into the second AIDS decade where relapse rather than initial behavior change is an increasing concern (Stall et al., 1990), understanding how to make prevention messages attractive and influential is paramount. Our results suggest the importance of positive expectancy-value beliefs and normative influences in shaping behavioral intentions. These intentions appear to function as significant proximal factors in gay men's sexual risk behaviors.

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