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Safer Sex Intentions and Condom Use Viewed from a Health Belief, Reasoned Action, and Social Cognitive Perspective

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We conducted three studies and used structural equation modeling to examine how well the health belief model, the theory of reasoned action, and social cognitive theory are capable of explaining heterosexual persons' sexual risk taking. Study 1 was conducted with sexually active young adults (college students) who completed an anonymous questionnaire about their sexual behavior and concepts pertaining to the three models. The analyses identified conceptually analogous concepts in the three models that explained a significant part of the variance in intentions to practice safer sex. These concepts referred to cognitive-affective reactions toward condom use and the social context of using condoms. A concept unique to social cognitive theory, self-efficacy, explained additional variance. In Study 2, these findings were replicated with sexually active older adults (members of a singles network). In both studies, the model based on social cognitive theory explained more than 70% of the variance in intentions to use condoms. In Study 3, this model was then tested longitudinally over a three-month interval with sexually active college students. It explained 50% of the variance in condom use. Together, the studies suggest that condom use in heterosexual relations depends to a significant degree on three key factors: the expected consequences of condom use, perceived social support for using condoms, and self-efficacy.

Statistics released by the Centers for Disease Control have shown a gradual increase in HIV infections contracted through heterosexual intercourse. In 1983, only 1% of all diagnosed AIDS cases was attributed to heterosexual contact; by 1990, this number had risen to 5%, and currently stands at 7% (Centers for Disease Control, 1994). At the same time, research findings suggest that most heterosexuals continue to perceive themselves not at risk for HIV infection and have not changed their sexual behavior in any fundamental way. This became apparent in a recent national survey, in which Catania et al. (1992) found that fewer than one fifth of heterosexuals with an HIV risk factor reported consistently using condoms. These statistics suggest that health-education messages directed at the general population have not had the intended effect. Warning the public and disseminating facts about HIV transmission may be an important prerequisite to behavior change. But it is unlikely that such messages by themselves are sufficient to change ingrained sexual habits, expectations, and attitudes that are often supported by the values and norms of the dominant culture or particular subcultures.

A major step in developing more effective prevention and behavior-change programs is to understand the psychological and social-psychological determinants of people's decision to adopt AIDS risk-reducing behaviors. This step may best be accomplished if research is guided by theory. In a recent *Science* article (Aggleton, O'Reilly, Slutkin, & Davies, 1994), three principal conceptual models were identified as potentially useful frameworks for understanding the psychological factors involved in HIV prevention. Each model explains how individuals assess and interpret information about health threats, what importance they attribute to this information, and which factors influence their perceived capability of taking preventive action. These models are briefly described.

Health belief model. According to the health belief model (HBM) (Janz & Becker, 1984; Rosenstock, 1974), preventive actions result from a decision-making process through which people evaluate the severity of a disease, the degree to which they believe themselves susceptible to it, and the benefits and barriers they expect from adopting preventive behaviors. In the area of HIV prevention (Emmons et al., 1986; Hingson, Strunin, Berlin, & Heeren, 1990; Joseph, Montgomery, Emmons, Kessler et al., 1987), researchers have found the benefit/barrier dimension to be more consistently associated with behavior change than either perceived severity or vulnerability (for reviews, see Carmel, 1990/91, and Montgomery et al., 1989), but, on balance, research has led to conflicting results. Some researchers have therefore questioned whether the HIV epidemic

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fits well within the conceptual framework of the HBM (Brown, DiClemente, & Reynolds, 1991; Montgomery et al., 1989).

Theory of reasoned action. The theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; also see Fishbein et al., 1992, for a synopsis of the theory's main tenets) posits that a specific health-protective action is determined mainly by the intention to perform it (see Fishbein & Middlestadt, 1989, for a detailed discussion of this issue). Intention, in turn, is shaped by an attitudinal component (feelings about performing the behavior, which result from the expected outcomes of the behavior and the importance attributed to them) and a normative factor (beliefs about what significant others think about the behavior in question). The TRA has received substantial empirical support in predicting health-protective behaviors, including safer sex (Cochran, Mays, Ciarletta, Caruso, & Mallon, 1992; Fishbein et al., 1992; Jemmott & Jemmott, 1991).

Social cognitive theory. According to social cognitive theory (SCT) (Bandura, 1986, 1990), health-protective behavior results from a process of cognitive appraisal by which people integrate knowledge about a disease, outcome expectancies associated with adopting preventive behaviors, and social influences. The result of this integrative process is a judgment of "self-efficacy" or an estimate of how well one will be able to cope with a difficult situation, which moderates behavior. Hence, individuals practice safer sex only to the degree that they believe in their ability to do so, given the emotional and interpersonal circumstances of their lives. SCT has been used to explain diverse health behaviors, including HIV prevention (O'Leary, Goodhart, Jemmott, & Boccher-Lattimore, 1992; Wulfert & Wan, 1993).

In summary, the HBM, TRA, and SCT have successfully been used to explain a wide range of health-protective behaviors, including safer sex practices. According to Weinstein (1993), such theories "contain at least a grain of truth (so that) empirical tests typically yield some degree of confirmation, enough to keep the theory under scrutiny from being rejected" (p. 324). Weinstein therefore advocated that, in the interest of scientific progress, these theories be compared against each other to establish which models or variables are more influential than others in understanding specific preventive behaviors. Perhaps these theories can be used to predict a given behavior equally well because they partially overlap or embrace nominally different, yet functionally analogous constructs. To illustrate, the just-described models all view behavior to be affected by expected costs and benefits associated with risk reduction. In the HBM, this cost-benefit dimension is labeled benefits/barriers; in the TRA, it is subsumed under the concept of attitudes; and in SCT, it corresponds to outcome expectancies. Further, the TRA and SCT both incorporate social influences on behavior. In SCT they take on the form of comparisons with peers (models), and in the TRA, approval from significant others (subjective norms). Some theorists (Janz & Becker, 1984; Weinstein, 1993) would even argue that the core construct of social cognitive theory, self-efficacy, is nothing but a "barrier" to action. However, self-efficacy might better be treated as a separate construct because of its well-documented predictive power in numerous other areas of research (e.g., Bandura, 1986; Garcia, Schmitz, & Doerfler, 1990; Strecher, DeVellis, Becker, & Rosenstock, 1986; Wulfert & Wan, 1993). Also, the "barriers" component in the HBM already has the quality of a catch-all category so that nothing would be gained by further increasing its range (Rosenstock, Strecher, & Becker, 1988).

The previous examples suggested that the HBM, the TRA, and SCT might be more similar than different. This led us to conduct an empirical comparison of these models to examine with causal modeling techniques which common and unique variables predict safer sex intentions and behavior. To this end, we conducted three studies. In Study 1 we tested how well each of the three theories explains sexually active young adults' intentions to use condoms. In Study 2 we replicated the three models with data from sexually active older adults to establish the generality of the findings. Finally, in Study 3 we conducted a longitudinal test of the model based on social cognitive theory.

Study 1

Method

Participants. A convenience sample of 496 undergraduate students enrolled in advanced psychology courses completed an anonymous questionnaire for extra course credit. Only students who described themselves as heterosexual, single, and sexually active during the previous six months were included in the analyses. Ninety-three students (19% of the original sample) were excluded because they were sexually inactive (16%), married (1%), or homosexual (0.5%), or they presented incomplete data (1.5%). The final sample consisted of 201 men and 202 women ($N = 403$) who were predominantly White (87%), with a mean age of 20.3 years.

Measures

Instrument development. A self-report questionnaire was developed to gather information about sexual practices, condom use, AIDS-related knowledge, and constructs specific to the HBM, the TRA, and SCT. In a pilot study, 96 students anonymously completed an open-ended questionnaire about their sexual practices, beliefs about condoms, and reasons for using or not using them. Their answers, together with additional items from published

studies (Brown, 1984; Joseph, Montgomery, Emmons, Kirscht et al., 1987), served as the basis for the behavioral and expectancy items included in the instrument. An abbreviated version of an AIDS knowledge test (Sherr, 1987) and a scale for social desirability (Tellegen, 1982) were also included. The instrument was pretested by five research assistants to ensure clarity and readability of the questions. In a second pilot study, 112 students completed the instrument twice in a three-week interval. All variables retained in the final version demonstrated adequate test-retest reliability. Behavioral items showed test-retest reliability coefficients in the .90s; cognitive and attitude items, in the .70s and .80s. No item or scale retained for the final version fell below .70.

The questionnaire contained sections on demographic information (gender, age, ethnicity, marital status, religion), information about sexual practices (age at first sexual intercourse, number of sex partners, frequency of intercourse, condom use, reason for condom use, contraceptive behavior), and AIDS-related knowledge. The main dependent variable was intention to use condoms. This criterion was predicted in three separate analyses from model-specific constructs that pertained conceptually to the HBM, the TRA, and SCT. For the LISREL 8 analyses (Joreskog & Sorbom, 1993), all variables were measured with two or more indicators, whenever possible. Criterion and predictor variables are briefly discussed next.

Criterion Variable

Intention to use condoms. The criterion variable for the three models, intention to use condoms during the next three months, was measured with two items scored on seven-point scales. One asked how often the respondents intended to use condoms (from never to always); the other assessed agreement with the statement, "I intend to use condoms every time I have intercourse in the next three months" (from strongly disagree to strongly agree).

Predictor Variables

Health belief model. Perceived severity and vulnerability were measured with single indicators scored on seven-point scales (from "almost zero" to "almost 100%"). Severity was defined as the respondents' estimate of their survival chances if they were to become infected with the AIDS virus (Wulfert & Wan, 1993). Vulnerability was expressed as the likelihood that they might contract the AIDS virus (Joseph, Montgomery, Emmons, Kirscht et al., 1987). The benefit/barrier dimension was comprised of perceived consequences of condom use (scored on seven-point scales, from strongly disagree to strongly agree). Via factor analysis, the items were reduced to four clusters, which accounted for 70.1% of the variance. The clusters were labeled disease prevention (condoms preventing HIV infection and other sexually transmitted diseases), contraception (condoms preventing unwanted pregnancies), pleasure reduction (condoms interfering with sensation, spontaneity, and romance), and partner-related concerns (condoms creating distrust and embarrassment). The factors had good internal consistency (Cronbach's α was .94 for disease prevention, .81 for pleasure reduction, and .85 for partner-related concerns; contraception consisted of only one item). Partner-related concerns were excluded from further analyses, as the zero-order correlations of this variable with the criterion indicators were statistically nonsignificant.

Theory of reasoned action. All variables were measured on seven-point bipolar scales. Attitudes toward condoms were assessed with two indicators asking how the respondents felt toward always using condoms (from extremely unfavorable to extremely favorable) (Jaccard, personal communication, May 6, 1992). Social norms were measured with two indicators assessing the expected reactions by significant others (from strongly disapprove to strongly approve) for using condoms (Joseph, Montgomery, Emmons, Kirscht et al., 1987).

Social cognitive theory. Condom use self-efficacy was assessed with one global Guilford-type rating and a three-item scale (Cronbach's α coefficient = .82), with all items measured on seven-point scales (from completely unsure to completely sure). The global question (Wulfert & Wan, 1993) assessed confidence in always using condoms in the next three months. A three-item scale assessed confidence in using condoms when being highly aroused, using them every time when having intercourse, and resisting unprotected intercourse if no condoms are available. Because outcome expectancies are conceptually analogous to the benefits and barriers in the HBM (Rosenstock et al., 1988), the previously described factors (contraception, disease prevention, and pleasure reduction) served as expectancies. Social model influences were measured on seven-point scales asking respondents to compare their use of condoms to that of significant others and to state how much their friends would approve if they always used condoms (Wulfert & Wan, 1993).

Other Variables

AIDS knowledge. Ten true/false statements were selected from an existing AIDS knowledge test by Sherr (1987) (e.g., the AIDS virus can be passed during sexual intercourse from an infected woman to a man). The test score was calculated as the number of items answered correctly (possible range from 0 to 10).

Social desirability. The Desirable Response Inconsistency Scale (DRIN) (Tellegen, 1982) is a 22-item true/false questionnaire (e.g., I am a warm person rather than cool and detached). It served as an indicator of response bias due to social desirability.

Results and Discussion

Demographic information and sexual behavior. Descriptive information about the students' sexual behavior and condom use habits is presented on the left side of Table 1. The students reported having had sexual intercourse with an average of four (women) to five (men) sex partners during their lifetime (the range for women was 1-30; for men, 1-40). Although the majority of the young men (56%) and women (70%) had only one sex partner in the past six months, a sizable number (44% and 30%, respectively) reported two or more sex partners. No difference in condom use was found between those who reported one (n = 252) versus more than one (n = 151) sex partner during the past six months, t (401) = –.37, p = .71.

Eighty-eight percent of the students felt their risk of contracting the AIDS virus was "small" to "non-existent." This was reflected in the fact that only 28% of the men and 19% of the women reported *always* using condoms during the past six months, and of those who had used condoms at least once (n = 317), 76% stated contraception rather than disease prevention as the main reason.

General analytic approach. Tests were conducted with LISREL 8 (Joreskog & Sorbom, 1993) to analyze causal models for the HBM, TRA, and SCT. Before presenting the results of individual analyses, we will briefly explain the general analytic approach of structural equation modeling, such as LISREL. Structural equation modeling is a procedure that evaluates whether empirically observed relationships in a set of data can be reproduced by theoretically predicted relationships among constructs. Although with the theory being tested causal relationships between variables are often assumed, it is important to understand that structural equation modeling does not establish causality. Rather, it establishes the level of agreement between empirical data and a theory. This is achieved by translating theoretical predictions derived from a model into a set of linear regression equations and solving them simultaneously and iteratively via a maximum likelihood solution or other methods of estimation. The theoretical predictions are supported to the extent that the estimated and empirically observed covariances coincide. If theoretical and empirical covariances were to match perfectly, one would obtain a χ^2 statistic of zero; thus, a small or statistically nonsignificant χ^2 is one indication of an adequate fit between theory and data. However, as the χ^2 statistic often performs less than optimally (see Joreskog & Sorbom, 1993), researchers have recently begun to move away from it toward alternative methods of estimating the variance accounted for by a model. Two such measures are the Goodness of Fit Index (GFI) and the Comparative Fit Index (CFI), which have been shown to be more reliable indicators than χ^2 (Bollen & Long, 1993). The GFI and the CFI range from 0 to 1, and values of .90 or greater indicate an adequate fit between model and data (Bentler, 1990). In the analyses described next, we have based our decisions about model fit on GFI and CFI values; however, for reasons of continuity with the literature, we have also reported χ^2 values.

Test for multivariate normality and gender differences. Although we found a departure from multivariate normality in our data (Mardia's coefficient of multivariate kurtosis for the data was 82.20, with a normalized estimate of 36.54), for two reasons we decided that a maximum likelihood estimation was nevertheless appropriate. First, Jaccard and Wan (1995) recently demonstrated in Monte Carlo studies that this method of estimation is robust to many types of violations, including the one reported here. Second, an analysis of our data using the *robust* maximum likelihood estimation

Table 1

Descriptive Information about the Participants in Studies 1-3 and their Self-Reported Sexual Behaviors and Risk Perceptions

Variable	Study 1 (Students) (N= 403)	Study 2 (Singles) (N= 421)	Study 3 (Students) (N= 105)
Mean age (years):	20.3	46.3	20.6
Marital status:			
Single	98.5%	34.7%	96.4%
Separated/divorced/widowed	1.5%	65.3%	3.6%
Average number of sex partners:			
Past six months	1.9	1.7	1.3
Life time	4.4	10.4	4.1
Perceived AIDS risk:			
Small to nonexistent	88.1%	92.8%	89.1%
Moderate to strong	11.9%	7.2%	10.9%
Condom use (past six months):			
Never or almost never	33.0%	64.6%	38.6%
Sometimes	43.4%	23.0%	33.0%
Always	23.6%	12.4%	28.4%
Main reason for condom use:			
Contraception	76.3%	45.0%	72.3%
Disease prevention	23.7%	55.0%	27.7%
Number of sex partners reported during the three-month longitudinal interval:			
1 partner			74.0%
2 partners			19.0%
3 or more partners			7.0%
Condom use reported during the three-month longitudinal interval:			
Never or almost never used condoms			39.1%
Sometimes used condoms			30.4%
Always used condoms			30.5%

method proposed by Bentler (1993) showed comparable results. Hence, for all further analyses maximum likelihood estimations were used.

Next, the data were examined for potential interaction effects due to gender differences. Although a visual inspection of the mean scores and standard deviations for all variables indicated a similar *response pattern* for men and women, we sought to corroborate this impression by computing separate covariance matrices for men and women and comparing their equivalence. A χ^2 test of covariance equivalence (Jaccard, Turrisi, & Wan, 1990) failed to achieve nonsignificance, χ^2 (N = 403, df = 153) = 364.60, $p < .01$, but the GFI (.91) and CFI (.96) suggested that the covariances were quite similar. Therefore, the pattern of responses was considered equivalent for men and women, and their covariance matrices were pooled for all further analyses. (Gender differences, when they did occur, are described in the article.)

Test of models. In the first step of the analyses, zero-order correlations were computed for all variables included in the three models. Consistent with previous research (Wulfert & Wan, 1993), neither social desirability nor AIDS-knowledge scores were significantly correlated with intentions to use condoms and were therefore excluded from further analyses. Most students were well informed about the facts and myths of HIV transmission and on the average answered 8 of 10 questions correctly on the knowledge test. Although it could be argued that the knowledge test failed to predict safer sex behavior because of a ceiling effect, the current finding is consistent with those reported in other studies (Baldwin & Baldwin, 1988; Beaman & Strader, 1989; Joseph, Montgomery, Emmons, Kessler et al., 1987; McKusick, Hortsman, & Coates, 1985; Wulfert & Wan, 1993).

In the second step of the analyses, tests of the HBM, the TRA, and SCT were conducted. The means and standard deviations for the criterion and predictor variables are presented in the left column of Table 2. The fit of each model was evaluated with LISREL 8, using the sample covariance matrix as input and a maximum likelihood solution. The models were statistically overidentified. Although most constructs were measured with two indicators, for some variables only single indicators were available. As such measures can introduce a bias in the estimates of the structural coefficients, the measurement error for single-indicator constructs was explicitly modeled with a strategy suggested by Hayduk (1987). This involved constraining the theta delta and theta epsilon matrices to error variances that were derived from the test-retest reliability coefficients of the pilot study.

In the structural models (see Figures 1-3), the strength of association between the exogenous (predictor) and endogenous (mediator and criterion) variables is expressed in the structural coefficients, with unstandardized coefficients appearing on each path and standardized ones provided in parentheses. To illustrate the meaning of a structural coefficient, assume that a path from variable A to B shows a coefficient of .40; this indicates that for every 1-unit change in variable A, a .40-unit change in variable B is expected, if all other variables are held constant. For clarity of presentation, the correlations between the exogenous variables have been omitted in the figures. The residual variances for the endogenous variables (designated with the Greek letter ε) are presented in standardized form; they indicate the proportion of unexplained or error variance in the endogenous variables.

Health Belief Model. The HBM (see Figure 1) accounted for 28% of the variance in intentions to use condoms. Statistically, the correspondence between model and data was excellent, with a nonsignificant χ^2 (N = 403, df = 15) of 13.03 (p = .60), a GFI of .99, a CFI of 1.00, and small modification indices. However, from a theoretical perspective the HBM was only marginally supported. Only two variables pertaining to the benefit-barrier dimension were statistically significant. Specifically, intentions to use condoms increased with stronger endorsements of their

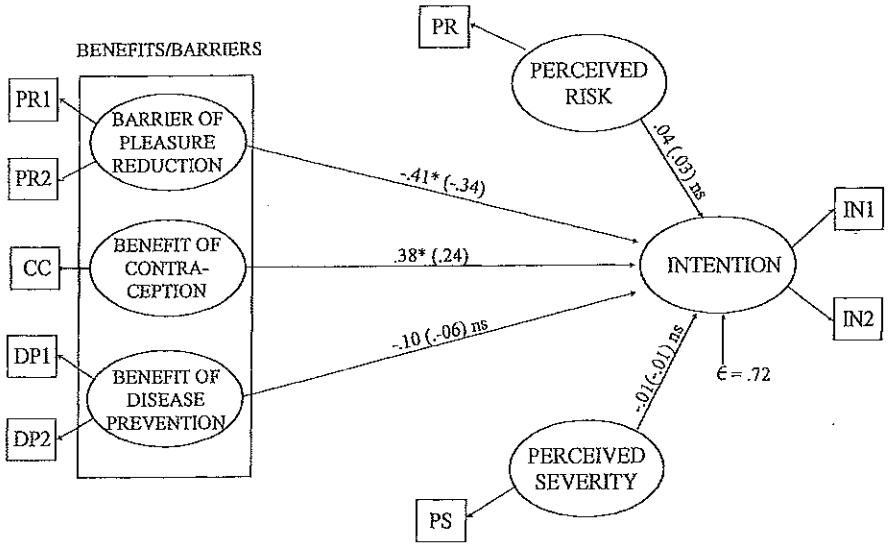
Table 2

Means and Standard Deviations of the Criterion and Predictor Variables Pertaining to the HBM, the TRA, and SCT (Studies 1 and 2), and to SCT (Study 3)*

Construct Indicators	Study 1 (Students) (N= 403) Mean (S.D.)	Study 2 (Singles) (N = 421) Mean (S.D.)	Study 3 (Students) (N = 105) Mean (S.D.)
Criterion Variables:			
Condom use			3.1 (1.6)
Intentions to use condoms	4.7 (2.4)	3.3 (2.3)	
Predictor Variables:			
Health Belief Model:			
Severity	2.5 (1.7)	2.3 (1.6)	
Risk	3.2 (1.5)	3.0 (1.5)	
Disease-prevention benefit	6.3 (1.3)	6.4 (1.2)	6.0 (1.3)
Contraceptive benefit	6.3 (1.3)	5.4 (1.9)	6.2 (1.2)
Pleasure-reduction barrier	4.2 (2.0)	4.8 (2.0)	4.5 (1.6)
Theory of Reasoned Action			
Attitude	4.9 (2.0)	3.6 (2.2)	
Norms	6.0 (2.1)	5.1 (1.7)	
Social Cognitive Theory			
Self-Efficacy	5.2 (1.6)	4.8 (2.0)	5.6 (1.6)
Models	5.6 (1.5)	4.7 (1.8)	4.9 (1.0)
For Expectancies: see benefits and barriers (HBM)			

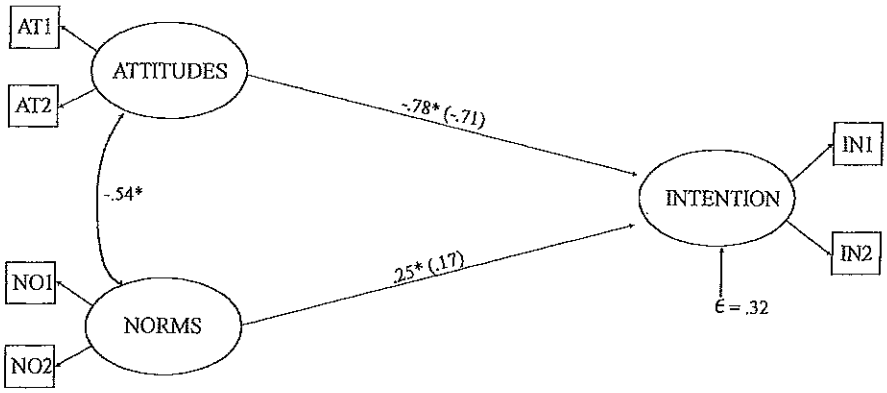
*The means and standard deviations refer to the averages of multiple indicators that were employed for each construct.

Figure 1. Health Belief Model Explaining Students' Intentions to Use Condoms



Note: Unstandardized path coefficients with asterisks are statistically significant at $p < .05$ (standardized path coefficients in parentheses). (ε = residual variance. Variable indicators: PR1, PR2 = pleasure reduction; CC = contraception; DP1, DP2 = disease prevention; PR = perceived risk; PS = perceived severity; IN1, IN2 = intention to use condoms)

Figure 2. Theory of Reasoned Action Explaining Students' Intentions to Use Condoms



Note: Unstandardized path coefficients with asterisks are statistically significant at $p < .05$ (standardized path coefficients in parentheses). (ε = residual variance. Variable indicators: AT1, AT2 = attitudes; NO1, NO2 = norms; IN1, IN2 = intention to use condoms)

contraceptive benefits and decreased with perceptions that they diminish sensation and sexual pleasure. The relationship between disease-prevention benefits and condom-use intentions was nonsignificant. Consistent with other studies (e.g., Dawson, Fitzpatrick, Boulton, McLean, & Hart, 1992; Wulfert & Wan, 1993), the remaining HBM variables also failed to predict as neither severity of AIDS nor perceived vulnerability to HIV infection was correlated with intentions to use condoms.

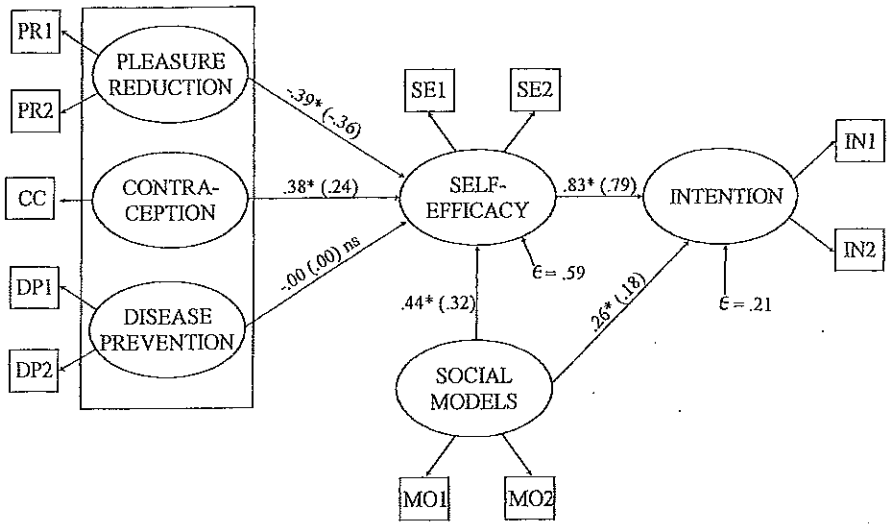
Theory of Reasoned Action. In the model based on the TRA, the theoretically predicted and empirically observed relationships matched closely (see Figure 2), which is consistent with previous research (Cochran et al., 1992; Fishbein et al., 1992). Attitudes toward condoms and social norms supporting condom use were both significantly related to condom-use intentions. Together they accounted for 68% of the variance in the criterion. The χ^2 (N = 403; df = 6) of 4.48 was statistically nonsignificant (p = .61), both GFI and CFI were 1.00, and there were no significant modification indices.

Social Cognitive Theory. Consistent with previous research (O'Leary et al., 1992; Wulfert & Wan, 1993), SCT was also supported. The model (see Figure 3) explained 41% of the variance in self-efficacy and 79% of the variance in intentions to use condoms. Although the χ^2 (N = 403, df = 33) of 94.99 failed to achieve nonsignificance ($p < .01$), small modification and large goodness-of-fit indices (GFI = .96, CFI = .98) indicated an adequate match between theoretical and empirical relations. Consistent with SCT, in our model intentions to use condoms were a function of self-efficacy and perceived social support for condom use. Self-efficacy, in turn, was a function of perceived social support and expectancies. More specifically, self-efficacy was positively associated with beliefs in the contraceptive utility of condoms and negatively with beliefs that condoms diminish sensation and sexual enjoyment. Disease-prevention expectancies were unrelated to self-efficacy.

Summary and Implications

Empirical tests of three conceptual models grounded in the HBM, the TRA, and SCT showed that each theory is capable of explaining some degree of the variance in intentions to practice safer sex. A closer examination of the three models revealed, first, that the underlying theories all predict behavior in part from constructs tapping into a cognitive cost-benefit dimension. This dimension is referred to as expectancies (SCT), attitudes (TRA), or benefits/barriers (HBM). Second, the TRA and SCT also emphasize a social context dimension. In the TRA, it takes on the form of perceived approval from significant others (subjective norms), and in the SCT, it is expressed as normative behaviors displayed by significant others (social model influences). Third, SCT moves beyond these shared constructs and makes a unique contribution by taking into

Figure 3. Social-Cognitive Theory Explaining Students' Intentions to Use Condoms



Note: Unstandardized path coefficients with asterisks are statistically significant at $p < .05$ (standardized path coefficients in parentheses). (ε = residual variance. Variable indicators: PR1, PR2 = pleasure reduction; CC = contraception; DP1, DP2 = disease prevention; MO1, MO2 = social models; SE1, SE2 = self-efficacy; IN1, IN2 = intention to use condoms)

account people's confidence in carrying out their intentions to use condoms (self-efficacy). Taken together, these findings imply that a large part of the variance in condom-use intentions can be explained by three concepts: the strength of people's self-efficacy beliefs, their subjective evaluation of the expected consequences of condom use, and the support they perceive from their social environment for using condoms.

Although all three models examined here were structurally adequate (as shown by the goodness-of-fit and modification indices), the amount of variance they explained in the criterion was a direct function of how many concepts they contained of those that we previously identified as relevant. The HBM, which contained the cost-benefit dimension ("benefits/barriers"), explained 28% of the variance in intentions to use condoms. The TRA, which contained the cost-benefit ("attitude") and the social context dimension ("norms"), explained 68% of the variance in the criterion. Finally, SCT, which in addition to the cost-benefit ("expectancies") and the social dimension ("social model influences") also included self-efficacy, accounted for 79% of the variance in condom use intentions. Thus, intentions to practice safer sex were influenced not only by outcome expectancies and social conventions but also by how strongly people believed that consistent condom use is possible within their specific emotional and interpersonal situation.

Some readers not entirely familiar with the theories tested here might wonder what the difference is between "condom-use self-efficacy" and "condom-use intentions." In fact, they might conclude that self-efficacy and intentions are nothing but different measures of people's subjective probability regarding their own behavior. In that case, the SCT-based model would contain the same construct twice, which technically would amount to an X-Y contamination and spuriously increase the variance accounted for by this model. To allay these concerns, we conducted a confirmatory factor analysis. We compared the fit of a one-factor model, assuming that all self-efficacy and intention indicators measure a single construct, with the fit of a two-factor model, assuming that these indicators measure two constructs. A formal comparison of the fit indicators of these two models with a nested Chi-square strategy (see Jaccard & Wan, 1995, for a discussion of this strategy) unequivocally supported a two-factor model, $\chi^2 = 43.42$, $df = 1$, $p < .001$. The two-factor model was also favored by a significantly better goodness-of-fit index (CFI = .99) when compared to a one-factor solution (CFI = .86). Hence, this analysis lends statistical support to the validity of a distinction between self-efficacy and intention that has elsewhere been made on theoretical grounds (Bandura, 1986).

Next, we sought to evaluate whether the findings reported previously would generalize to another population. We therefore replicated Study 1 with older adults who were recruited from a singles network.

Study 2

Method

Participants. Members of a Northeastern singles network completed an anonymous questionnaire. Of 643 respondents, 222 (35%) were excluded because they had not been sexually active during the past six months (30%), were bisexual (.5%), were living with someone (.5%), or had incomplete data (4%). Of the 205 men and 216 women ($N = 421$) included in the analyses, most were White (91%), were Christian (69%), had previously been married (65%), and had a mean age of 46 years.

Procedure. The names of 600 men and 600 women were randomly drawn from the organization's membership list. These members received a letter about the upcoming sexuality survey and the explicit nature of the questions and were offered to have their names removed from the mailing list by calling the membership office. Eighty-four individuals telephoned to refuse participation. The remaining 1,116 members received the questionnaire and two follow-up letters (mailed one and

three weeks later). The 643 returned questionnaires constituted 58% of those mailed and 54% of the initial list of 1,200.

Results and Discussion

Demographic information and sexual behavior. Descriptive information about the singles network members and their sexual habits is presented in the middle column of Table 1. Similar to the college students, the singles comprising this sample reported few sex partners during the past six months. Sixty-nine percent of the men and 74% of the women reported only one partner; the remaining 31% of the men and 26% of the women reported two or more sex partners. An inverse Pearson product-moment correlation between the number of sex partners during the past six months and age was statistically significant for women, $r = -.21, p = .002$, but not for men, $r = -.09$, $p = .18$. A gender difference was also apparent in the number of lifetime sex partners, with men reporting an average of 13, and women, 8 partners (the range for both genders was 1 to 100+).

Ninety-three percent of the respondents felt their risk for contracting the AIDS virus was "small" to "non-existent." Only 12% reported always using condoms. Of those who had used condoms at least once during the past six months ($n = 246$), 45% gave disease prevention and 55%, contraception as the main reason. Those who used condoms mainly for contraception ($n = 116$) were younger, $t\ (262) = -5.04$, $p < .001$, and also used condoms more often, $t\ (262) = 5.13$, $p < .001$, than those who gave disease prevention as the main reason ($n = 148$). Regardless of the stated reason, singles with more than one sex partner during the past six months ($n = 130$) tended to use condoms more frequently than those with only one sex partner ($n = 291$), $t\ (419) = -3.50$, $p < .001$. Nevertheless, only 12% of the male and 21% of the female non-monogamous singles *always* used condoms, whereas the majority used them inconsistently. This inconsistency was also reflected in the non-significant Pearson product-moment correlation, $r = -.10$, $p = .25$, between condom use and number of sex partners. Thus, older singles, like college students, engaged in behavior that potentially placed them at risk for sexually transmitted diseases, including HIV infection.

Test of the conceptual models. As in the previous study, we found that our data departed from multivariate normality (Mardia's coefficient of multivariate kurtosis for the data was 46.10, with a normalized estimate of 20.94). However, for the reasons mentioned before, we decided that a maximum likelihood solution was appropriate (see Jaccard & Wan, 1995). We also conducted a covariance test for possible gender differences. The results suggested that the covariances for men and women were selected from the same population, $\chi^2\ (N = 421, df = 55) = 59.05$, $p = .33$; GFI = .98; CFI = 1.00. The covariance matrices were therefore pooled for all further analyses.

Structural models identical to those displayed in Figures 1-3 were analyzed to test the fit of the three conceptual models for the singles data (means and standard deviations of the criterion and predictor variables are presented in the middle column in Table 2). The results of these analyses are presented in Table 3, which shows the unstandardized and standardized path coefficients as well as the amount of variance explained by each model.

The pattern of results obtained with the singles was almost identical to that of the college students. All three models were adequate, with GFIs of .99 (HBM and TRA) and .95 (SCT), and CFIs of .99 (HBM and TRA) and .98 (SCT). The HBM explained 20% of the variance in condom-use intentions from the benefit/barrier dimension. As in the previous study, neither perceived risk nor severity of AIDS predicted safer sex intentions. The only difference between the student and the singles model was a statistically significant path between disease-prevention benefits and intentions to

Table 3

Structural Path Coefficients and Variance in Intentions to Use Condoms Explained by the Health Belief Model, the Theory of Reasoned Action, and Social Cognitive Theory (Study 2)

Predictor Variable	→	Criterion Variable	Unstandardized Path Coefficient	Standardized Path Coefficient	Explained Variance
Health Belief Model:					
		Condom-Use Intention:			20%
Risk	→	Intention	.10	(.07)	
Severity	→	Intention	.14	(.11)	
Barriers	→	Intention	−.41*	(−.34)	
Benefit (contraception)	→	Intention	.15*	(.14)	
Benefit (disease prevention)	→	Intention	.19*	(.12)	
Theory of Reasoned Action:					
		Condom-Use Intention:			67%
Attitude	→	Intention	−.67*	(−.67)	
Norms	→	Intention	.30*	(.23)	
Social Cognitive Theory:					
		Condom-Use Intention:			73%
		Self-Efficacy			40%
Expectancies:					
(a) Pleasure reduction	→	Self-efficacy	−.43*	(−.36)	
(b) Contraception	→	Self-efficacy	.12*	(.11)	
(c) Disease prevention	→	Self-efficacy	.02	(.01)	
Models	→	Self-efficacy	.51*	(.40)	
Models	→	Intention	.39*	(.28)	
Self-efficacy	→	Intention	.73*	(.67)	

*statistically significant path coefficients, $p < .05$

use condoms, suggesting that within an HBM framework, concerns about disease prevention played a stronger role among older singles than students. The results for the other two models were almost identical for students and singles. The TRA explained 67% of the variance in condom-use intentions from attitudes and norms. SCT explained 73% of the variance in condom-use intentions from self-efficacy and social model influences, and 40% of the variance in self-efficacy from pleasure-reduction expectancies, contraceptive expectancies, and social model influences. Thus, we replicated the results from the previous study, which indicates that intentions to practice safer sex can be explained by the same three concepts in college students and older adults.

Summary and Implications

In both studies, the three models showed adequate goodness-of-fit indices and explained a substantial amount of the variance in safer sex intentions. This should not come as a surprise because in the social sciences many events can be explained from a number of different perspectives, as our theories simply lack the degree of sophistication and specificity that would be necessary to put them to a crucial test (Platt, 1964). As causal modeling techniques are not meant to "confirm" a particular theory but simply indicate how well a given model fits the data, several models may indeed provide plausible explanations of the same data (Loehlin, 1987).

For several reasons, we found the SCT-based model particularly compelling. First, it subsumes the "active elements" contained in the TRA and the HBM and explained the largest amount of variance in condom-use intentions. Second, by including self-efficacy, it adds a theoretically well-defined mechanism of behavior change that has received strong empirical support in a variety of health-related areas. Finally, the model has significant applied implications because, by following Bandura's (1986) guidelines on how to increase self-efficacy, it suggests specific ways of how to decrease risky sexual behavior. Hence, an SCT-based model not only contributes to our understanding of the psychological determinants of unsafe sexual behavior but also can be used for designing effective intervention and prevention programs.

Despite the successful replication of our findings, our confidence must be tempered by the inherent limitations of cross-sectional research. In both studies we identified correlates of people's *intentions* to use condoms, but we did not demonstrate that these correlates predict actual *condom use.* Although intention often may be an accurate predictor of behavior (see Fishbein & Middlestadt, 1989), it is important to remember that situational factors, social pressure, the effects of alcohol or drug use, and a host of other variables can intervene between intention and behavior. Therefore, to investigate whether the three variables we identified in fact play a role in the decision to practice safer sex, we conducted a third study. In this study, we followed a group of young adults over a three-month interval and sought to predict actual *condom use* from their initially obtained statements about expectancies, social support, and self-efficacy.

Study 3

Method

Participants. A convenience sample of 177 undergraduate students was recruited from the same pool used in Study 1. Of those, 72 students (41%) were excluded because they were sexually inactive (33%), married/cohabitating (4%), or homo/bisexual (1%), or they presented incomplete data (3%). The final sample was comprised of 105 sexually active students (21 men and 84 women) who were predominantly White (77%), with a mean age of 20.6 years.

Procedure. The students were recruited from advanced psychology classes and received extra course credit. During the initial assessment, they completed an abbreviated version of the anonymous questionnaire used in the previous studies. Three months later they answered questions about their sexual behavior since the first assessment. To ensure that the two assessments could be matched while maintaining the respondents' anonymity, the students marked both questionnaires with an identical self-generated code.

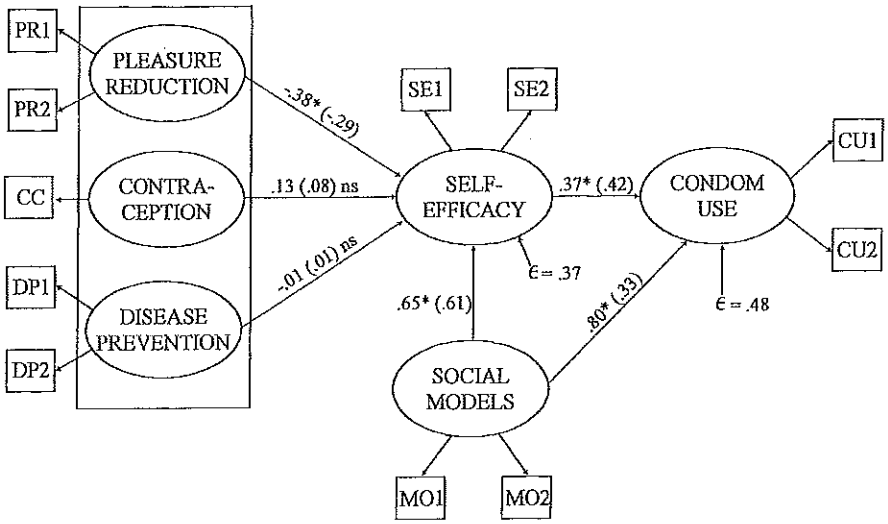
Results and Discussion

Demographic information and sexual behavior. Descriptive information about the students and their sexual behavior is presented in the right column of Table 1. Although most participants (62% of the men and 77% of the women) reported only one sex partner during the three-month interval between assessments, a sizable number reported two (28% and 17%, respectively) or three and more partners (10% and 6%, respectively). Based on self-report, 33% of the men and 27% of the women always used condoms during this time period. There was neither a significant correlation between number of sex partners and condom use, $r = .20$, $p = .23$, nor a difference in condom use between students with only one sex partner ($n = 78$) and those with more than one partner ($n = 27$); t (103) = $-.42$, $p = .67$.

Similar to the previous studies, 89% of the participants in Study 3 perceived themselves at minimal risk for contracting the AIDS virus, and their risk perceptions were unrelated to condom use.

Test of the conceptual model. The SCT-based structural model displayed in Figure 4 was tested with LISREL 8 (means and standard deviations of the predictor and criterion variables are presented in the right column of Table 2). The test established how well the model predicted self-reported condom use

Figure 4. Social-cognitive Theory Predicting Students' Condom Use Longitudinally over Three Months



Note: Unstandardized path coefficients with asterisks are statistically significant at $p < .05$ (standardized path coefficients in parentheses). (ε = residual variance. Variable indicators: PR1, PR2 = pleasure reduction; CC = contraception; DP1, DP2 = disease prevention; MO1, MO2 = social models; SE1, SE2 = self-efficacy; CU1, CU2 = condom use)

from expectancies, social influences, and self-efficacy beliefs over a three-month interval. The model fit was very good with a nonsignificant χ^2 ($N = 105$, $df = 34$) of 44.65 ($p = .10$), a GFI of .93, a CFI of .98, and negligible modification indices. The model explained 52% of the variance in self-reported condom use from self-efficacy and social model influences. It also explained 63% of the variance in self-efficacy beliefs. Self-efficacy was a function of whether the students viewed condom use as a behavior approved of and practiced by peers and how much pleasure reduction they expected from condom use. Positive expectancies concerning disease prevention and contraceptive benefits of condoms were not significantly correlated with self-efficacy beliefs.

Thus, the longitudinal study replicated the findings from the cross-sectional research and established that the variables that correlated with intentions to use condoms in fact predicted self-reported condom use over a three-month interval. Condom use was mainly predicted by self-efficacy, which, in turn, was influenced by outcome expectancies. Perceiving condom use as a behavior approved of and practiced by one's peers was positively associated both with self-efficacy and condom use. Among the anticipated consequences of condom use, beliefs that condoms diminish sexual enjoyment had a strong and consistent relationship with self-efficacy. Contraceptive and disease-prevention expectancies were not significantly correlated with self-efficacy, most likely because almost all respondents agreed that condoms are effective contraceptives and prevent disease. This finding suggests that attempts to increase condom use by emphasizing their benefits may be "carrying coal to Newcastle," because most heterosexuals fully agree that these are potential advantages of using condoms. However, this may not motivate them to change their behavior because they use other contraceptives and do not feel at risk for AIDS. A more effective strategy might be to instill realistic risk appraisals, counteract negative expectancies, and model affirmative attitudes toward making condoms part of the sexual experience.

General Discussion

Individual decisions to use condoms may depend to a significant degree on three key factors: the expected personally relevant consequences of condom use, whether one perceives condom use as a behavior approved of and practiced by one's peers, and beliefs that one will be able to use condoms consistently, given the specific emotional and interpersonal circumstances of one's life. These variables were identified in three separate studies with different populations and predicted intentions to use condoms in a cross-sectional design as well as self-reported condom use in a longitudinal design. As these key factors are the main constituents of a self-efficacy model, they provide substantial support for SCT as a useful framework for understanding safer sex behavior.

Before addressing the implications of these findings for HIV prevention, some methodological issues will be discussed. First, questions might be raised about the operationalization of some HBM, TRA, and SCT concepts. In the current studies, complex constructs such as attitudes, social norms, and self-efficacy were measured with only a few indicators, although, based on psychometric considerations, such constructs are often assessed with multi-item scales. Yet a priori assertions that multi-item measures are better or lead to substantially different outcomes than single- or few-item measures seem unwarranted for several reasons. First, Erickson, Tiffany, Martin, and Baker (1983) showed that a single self-efficacy rating can be a solid predictor of long-term behavior change. Second, Jaccard, Weber, and Lundmark (1975), after performing a multitrait-multimethod analysis of four attitude-assessment procedures, concluded that, from a practical perspective, "a single measure of attitude (Guilford) or a few-item measure (semantic differential) will yield approximately the same

results as a multi-item assessment device (Likert & Thurstone)" (p. 153). Finally, Wulfert, Weaver, and Wan (1994) examined in a longitudinal study how well condom use could be predicted from established multi-item scales as compared to the attitude and self-efficacy measures used in the current and previous (Wulfert & Wan, 1993) studies. They found condom use to correlate .47 with a one-item attitude rating and .46 with Brown's (1984) Attitude Toward the Condom (ATC) scale. Further, condom use correlated .62 with the one-item self-efficacy measure and .53 with a three-item self-efficacy scale used in the current studies, and .32 with Brafford and Beck's (1991) Condom Use Self-efficacy Scale (CUSES). In subsequent multiple regressions, one-item attitude and self-efficacy measures predicted 43% of the variance in condom use, whereas the ATC and CUSES together explained 22%. These differences in explained variance cannot be attributed to measurement error because the test-retest reliability coefficients for the single- and the three-item measure and the internal consistency of the three-item and the multi-item measures were all higher than .80. Thus, these findings together suggest that, under some circumstances, the global assessment of a concept with a single- or few-item measure can be as good as, or better than, a multi-item measure.

Second, some readers might question the specific versions of the HBM, TRA, and SCT we tested in light of the fact that derivative models exist. For example, one TRA version (the theory of planned behavior by Ajzen, 1988) contains a construct similar to self-efficacy, and self-efficacy has also been incorporated as a "barrier" in an expanded version of the HBM (see Rosenstock et al., 1988). Adding this SCT core construct to the HBM and TRA might well have increased the explanatory power of these models in the previous studies. However, we decided to test the "classic" versions of these theories to determine their original contributions rather than testing derivative models with a yet greater overlap in crucial constructs.

In evaluating the current findings, the reader should keep in mind the purpose of this research. The three studies were not designed to decide which of the three models tested here best explains risk behavior but to identify possible common as well as unique features of the models that may be determinants of sexual risk taking. To paraphrase Weinstein (1993), showing that one theory correlates .40 and the other .50 with behavior is not nearly as useful as discovering which variables account for this difference. With our research, we took one step in this direction. Recall that, in the two cross-sectional studies, the HBM, which contained one of the constructs analogous in the three models, accounted for less than 30% of the variance in intentions to use condoms; the TRA, which contained two of the relevant constructs, explained more than 60%, and SCT, which contained three, accounted for more than 70% of the variance. Thus, by comparing and contrasting the individual models, we identified three key variables that contribute to people's intentions to practice safer sex. When we then examined how well these variables predict behavior longitudinally (Study 3), together they explained more than 50% of the variance in self-reported condom use. Given the robustness of these findings across the three studies, it is reasonable to assume that these variables constitute important correlates, if not determinants, of sexual risk behavior.

Let us now look at some implications of the current research. To date, most heterosexuals in the U.S. are still at low risk for HIV infection. However, as the base rate of HIV infection among heterosexuals gradually rises, so-called "mainstream" individuals may increasingly jeopardize their health if they continue to engage in unsafe sexual practices. This underlines the need for implementing behavior change programs in settings such as schools, colleges, and organizations that provide the opportunity for social interactions and dating among singles to prevent HIV from spreading to the population at large. The current research indicates that, rather than merely educating and warning the public about HIV transmission, behavior-change programs must target changes in one or more key variables previously identified. Above all, systematic attempts should be made to strengthen people's faith in their ability to protect themselves from HIV infection, given the specific circumstances of their lives. Such changes in self-efficacy could be accomplished with modeling and skills-training techniques that change inaccurate risk perceptions; modify attitudes; develop self-protective cognitive, verbal, and behavioral skills; and increase the general acceptability of condoms by creating a supportive social environment.

Several studies with high-risk populations have accomplished goals such as those described here. For example, Kelly et al. (1991, 1992) trained popular opinion leaders to change attitudes and social norms concerning the practice of safer sex among gay bar patrons. Their research shows how, through the use of social models and skills training, changes in attitudes and behavior can be promoted in communities. Numerous other interventions developed within a social learning or cognitive framework have demonstrated the influence of models provided by the media, peers, and significant others. Having models display a behavior and showing what consequences result from it are powerful means of shaping people's expectations and affecting their sense of self-efficacy (Bandura, 1986). Therefore, widespread changes in attitudes toward

condoms and enhanced self-efficacy beliefs might be attained through the influence of role models who set up positive expectancies by emphasizing the benefits and social acceptability of self-protective behaviors. For example, condom use and other safer sex practices could be consistently and massively promoted by highly visible popular persons from film, theater, music, and sports, or by community leaders, respected authority figures, and well-liked peers in school and the workplace. These role models could be trained to denounce unprotected sexual intercourse as an undesirable and irresponsible action as well as counteract negative stereotypes associated with condoms, advocate the positive aspects of practicing safer sex, and demonstrate the cognitive and behavioral skills necessary to make health-protective decisions and negotiate them with a partner. These models could also show sensitivity to the different types of challenges in communication skills faced by men and women and demonstrate techniques women might use to increase men's willingness to use condoms.

It is not easy to change complex behavior patterns or lifestyles, but as the literature on smoking cessation, the treatment of substance abuse, and coronary risk reduction shows, it can and has been done. We have identified several important factors involved in heterosexual individuals' decisions to practice safer sex, but these variables should not be viewed as exhaustive. Sexual behavior occurs in a complex interpersonal, social, and cultural context and is determined by a range of influences in addition to those specified in the models examined previously. As the HBM, the TRA, and SCT are all based on the assumption that individuals make deliberate, volitional decisions, these models may be appropriate in the context of largely consensual encounters (Aggleton et al., 1994). Whether they are useful in circumstances in which sexual behavior is influenced by implicit or explicit coercion, rigidly defined cultural expectations, heavy intoxication, or other factors that may interfere with free choice awaits the outcome of further research. Therefore, although we have identified several important factors involved in individual decisions to use condoms, much additional work is needed before we can achieve a better understanding of the sexual negotiation process.

References

Aggleton, P., O'Reilly, K., Slutkin, G., & Davies, P. (1994). Risking everything? Risk behavior, behavior change, and AIDS. *Science, 265,* 341-345.

Ajzen, I. (1988). *Attitudes, behavior and personality.* Chicago: The Dorsey Press.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice Hall.

Baldwin, J. D., & Baldwin, J. I. (1988). Factors affecting AIDS related sexual risk taking behavior among college students. *The Journal of Sex Research, 25,* 181-196.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1990). Perceived self-efficacy in the exercise of control over AIDS infection. *Evaluation and Program Planning, 13,* 9-17.

Beaman, M. L., & Strader, M. K. (1989). STD patients' knowledge about AIDS and attitudes toward condom use. *Journal of Community Health Nursing, 6,* 155-164.

Bentler, P. M. (1990). Comparative fit indices in structural models. *Psychological Bulletin, 107,* 238-246.

Bentler, P. M. (1993). *EQS program manual.* Los Angeles: BMD.

Bollen, K., & Long, S. (1993). *Testing structural equation models.* Newbury Park, CA: Sage.

Brafford, L. J., & Beck, K. H. (1991). Development and validation of a condom self-efficacy scale for college students. *Journal of American College Health, 39*(5), 219-225.

Brown, I. S. (1984). Development of a scale to measure attitude toward the condom as a method of birth control. *The Journal of Sex Research, 20,* 255-263.

Brown, L. K., DiClemente, R. J., & Reynolds, L. A. (1991). HIV prevention for adolescents: Utility of the health belief model. *AIDS Education and Prevention, 3,* 50-59.

Carmel, S. (1990/91). The health belief model in the research of AIDS-related preventive behavior. *Public Health Reviews, 18,* 73-85.

Catania, J. A., Coates, T. J., Stall, R., Turner, H., et al. (1992). Prevalence of AIDS-related risk factors and condom use in the United States. *Science, 258,* 1101-1106.

Centers for Disease Control. (1994). *HIV/AIDS surveillance report, 6*(2). Atlanta: CDC.

Cochran, S. D., Mays, V. M., Ciarletta, J., Caruso, C., & Mallon, D. (1992). Efficacy of the theory of reasoned action in predicting AIDS-related sexual risk reduction among gay men. *Journal of Applied Social Psychology, 22,* 1481-1501.

Dawson, J., Fitzpatrick, R., Boulton, M., McLean, J., & Hart, G. (1992). *Sozial and Präventivmedizin, 37,* 79-84.

Emmons, C. A., Joseph, J. G., Kessler, R. C., Wortman, C. B., Montgomery, S. B., & Ostrow, D. G. (1986). Psychosocial predictors of reported behavior change in homosexual men at risk for AIDS. *Health Education Quarterly, 13,* 331-345.

Erickson, L. M., Tiffany, S. T., Martin, E. M., & Baker, T. B. (1983). Aversive smoking therapies: A conditioning analysis of therapeutic effectiveness. *Behaviour Research and Therapy, 21,* 595-611.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Fishbein, M., Chan, D. K-S., O'Reilly, K., Schnell, D., Wood, R., Beeker, C., & Cohn, D. (1992). Attitudinal and normative factors as determinants of gay men's intentions to perform AIDS-related sexual behaviors: A multisite analysis. *Journal of Applied Social Psychology, 22,* 999-1011.

Fishbein, M., & Middlestadt, S. (1989). Using the theory of reasoned action as a framework for understanding and changing AIDS-related behaviors. In V. Mays, G. Albee, & S. Schneider (Eds.), *Primary prevention of AIDS: Psychological approaches* (pp. 93-110). Newbury Park, CA: Sage.

Garcia, M. E., Schmitz, J. M., & Doerfler, L. A. (1990). A fine-grained analysis of the role of self-efficacy in self-initiated attempts to quit smoking. *Journal of Consulting and Clinical Psychology, 58,* 317-322.

Hayduk, L. A. (1987). *Structural equation modeling with LISREL: Essentials and advances.* Baltimore: Johns Hopkins University Press.

Hingson, R. W., Strunin, L., Berlin, B. M., & Heeren, T. (1990). Beliefs about AIDS, use of alcohol and drugs, and unprotected sex among Massachusetts adolescents. *American Journal of Public Health, 80,* 295-299.

Jaccard, J. J., Turrisi, R., & Wan, C. K. (1990). *Interaction effects in multiple regression.* Newbury Park, CA: Sage.

Jaccard, J. J., & Wan, C. K. (1995). *Interaction effects in multiple regression II: Multiple indicator and structural equation approaches.* Newbury Park, CA: Sage.

Jaccard, J. J., Weber, J., & Lundmark, J. (1975). A multitrait-multimethod analysis of four attitude assessment procedures. *Journal of Experimental Social Psychology, 11,* 149-154.

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A decade later. *Health Education Quarterly, 11,* 1-47.

Jemmott, L. S., & Jemmott, J. B. (1991). Applying the theory of reasoned action to AIDS risk behavior: Condom use among black women. *Nursing Research, 40,* 228-234.

Joreskog, K., & Sorbom, D. (1993). *LISREL 8: A guide to the program and applications.* Chicago: Scientific Software.

Joseph, J. G., Montgomery, S. B., Emmons, C. A., Kessler, R. C., Ostrow, D. G., Wortman, C. B., O'Brien, K., Eller, M., & Eshlemann, S. (1987). Magnitude and determinants of behavioral risk reduction: Longitudinal analysis of a cohort at risk for AIDS. *Psychology and Health, 1,* 73-96.

Joseph, J. G., Montgomery, S. B., Emmons, C. A., Kirscht, J. P., Kessler, R. C., Ostrow, D. G., Wortman, C. B., & O'Brien, K. (1987). Perceived risk of AIDS: Assessing the behavioral and psychosocial consequences in a cohort of gay men. *Journal of Applied Social Psychology, 17,* 231-250.

Kelly, J. A., St. Lawrence, J. S., Diaz, Y. E., Stevenson, L. Y., Hauth, A. C., Brasfield, T. L., Kalichman, S. C., Smith, J. E., & Andrew, M. E. (1991). HIV risk behavior reduction following intervention with key opinion leaders of a population: An experimental community-level analysis. *American Journal of Public Health, 81,* 168-171.

Kelly, J. A., St. Lawrence, J. S., Stevenson, L. Y., Hauth, A. C., Kalichman, S. C., Diaz, Y. E., Brasfield, T. L., Koob, J. J., & Morgan, M. G. (1992). Community AIDS/HIV risk reduction: The effects of endorsements by popular people in three cities. American *Journal of Public Health, 82,* 1483-1489.

Loehlin, J. C. (1987). *Latent variable models: An introduction to factor, path, and structural analysis.* Hillsdale, NJ: Erlbaum.

McKusick, L., Hortsman, W., & Coates, T. J. (1985). AIDS and the sexual behavior reported by gay men in San Francisco. *American Journal of Public Health, 75,* 493-496.

Montgomery, S. B., Joseph, J. G., Becker, M. H., Ostrow, D. G., Kessler, R. C., & Kirscht, J. P. (1989). The health belief model in understanding compliance with preventive recommendations for AIDS: How useful? *AIDS Education and Prevention, 1,* 303-323.

O'Leary, A., Goodhart, F., Jemmott, L. S., & Boccher-Lattimore, D. (1992). Predictors of safer sex on the college campus: A social cognitive theory analysis. *Journal of American College Health, 40,* 254-263.

Platt, J. R. (1964). Strong inference. *Science, 146,* 347-353.

Rosenstock, I. M. (1974). The health belief model and preventive health behavior. *Health Education Monographs, 2,* 354-386.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly, 15,* 175-183.

Sherr, L. (1987). An evaluation of the UK government health education campaign on AIDS. *Psychology and Health, 1,* 61-72.

Strecher, V. J., DeVellis, B. M., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. *Health Education Quarterly, 13,* 73-92.

Tellegen, A. (1982). *Brief manual for the differential personality questionnaire.* Unpublished manuscript.

Weinstein, N. D. (1993). Testing four competing theories of health-protective behavior. *Health Psychology, 12,* 324-333.

Wulfert, E., & Wan, C. K. (1993). Condom use: A self-efficacy model. *Health Psychology, 12,* 346-353.

Wulfert, E., Weaver, A., & Wan, C. K. (1994). *A comparison of three self-efficacy measures and their ability to predict condom use in college students.* Unpublished manuscript. State University of New York, Albany.

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