AIDS Behav (2007) 11:393–407
DOI 10.1007/s10461-007-9208-9

ORIGINAL PAPER

Using Theory to Understand How Interventions Work: Project RESPECT, Condom Use, and the Integrative Model

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Published online: 24 February 2007

Abstract The Integrative Model of Behavioral Prediction (IM) provides guidelines for the development of successful HIV/STD interventions, yet few HIV prevention programs have identified which components of the IM have been associated with successful behavioral outcomes. Using structural equation modeling, this study examines in detail how components of the IM assessed prior to, and immediately after, the delivery of an intervention are associated with reported condom use 3 months later among participants in Project RESPECT, a multisite randomized controlled trial testing HIV/STD risk reduction strategies among clients attending public health clinics for sexually transmitted diseases. Overall, the IM predicted condom use at 3 months; there were, however, variations in the relative contribution of differing IM components as a function of gender and type of sexual partner as well as the type of intervention the participant had received.

Keywords Condom use · Theory of reasoned action · Social cognitive theory · Health belief model · HIV

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Introduction

A large number of HIV prevention programs have successfully reduced HIV risk among heterosexuals (Rotheram-Borus, Cantwell, & Newman, 2000). Project RESPECT is one such successful intervention. In Project RESPECT, 5,758 patients recruited at five public health clinics (Baltimore, MD; Denver, CO; Long Beach, CA; Newark, NJ; and San Francisco, CA) for sexually transmitted diseases (STDs) were randomized to one of four face-to-face intervention conditions: (1) a four-session Enhanced Counseling condition that was based on an Integrative Model (IM) (Fishbein, 2000; Institute of Medicine (IOM), 2002; National Academy of Science (NAS), 2002) that incorporated variables from the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein, 1967; Fishbein & Ajzen, 1975), the Health Belief Model (Becker, 1974), and social cognitive theory (Bandura, 1977; 1994; 1997); (2) a two-session Brief Counseling condition based in part on the Health Belief Model and Social Cognitive theory that reflected best current practice in HIV test counseling (Centers for Disease Control and Prevention, 1993, 1994); Brief Counseling included both cognitive and action-oriented strategies to reduce risk; and (3) two comparison conditions in which 5-min

didactic messages were delivered in two sessions (Kamb et al., 1998a). Both the Enhanced Counseling and Brief Counseling interventions resulted in fewer incident STDs, reductions in unprotected sex acts, and increased condom use over the next 12 months (Kamb et al., 1998a). The Enhanced Counseling condition led to a greater reduction in unprotected sex and a greater increase in condom use than did the Brief Counseling condition, with small but generally consistent overall differences between the two conditions.

Several explanations are possible for the differential effectiveness of these two interventions. Clearly, this difference could simply reflect the fact that more than twice the dosage was delivered in Enhanced Counseling (4 sessions vs. 2 sessions; 200 min vs. 40 min of intervention exposure). Alternatively, the Enhanced Counseling intervention was directed at the three major determinants of behavior specified by the IM (attitudes, norms, and self-efficacy) while the Brief Counseling intervention was directed at increasing perceived risk, one specific health belief (use of condoms will protect against HIV and other STDs), and self-efficacy. Although the Enhanced Counseling intervention activities were designed to influence the theoretical components of the IM, the activities may not have impacted these components effectively. On the other hand, it is possible that the activities in the Brief Counseling condition may have influenced the major variables of the IM, perhaps even exerting a large influence on these factors, even though the activities had not been initially designed to change all of these variables. Given these possibilities, we examined: (1) if the components of the IM were related to participants' condom use across intervention condition and (2) how risk behaviors and condom use among participants in each intervention were related to the components of the IM over 3 months.

The IM was developed following an NIMH-sponsored workshop designed to consider the similarities and differences among several behavioral theories in order to identify a critical set of variables that serve as key determinants of behavior and behavior change (Fishbein et al., 2001). Based primarily on the theory of reasoned action and the theory of planned behavior (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein, 1967; Fishbein & Ajzen, 1975), as well as on Bandura's (1977, 1994, 1997) social cognitive theory and the Health Belief Model (Becker, 1974), the IM is a general theory of behavioral prediction that is assumed to be applicable to the understanding of any given behavior (see Fishbein, 2000; Fishbein & Yzer, 2003; IOM, 2002; NAS, 2002).

Consistent with the theories of reasoned action and planned behavior, the IM hypothesizes that intentions are the primary determinants of behavior. In turn, intentions are viewed as a function of three proximal determinants: (a) attitudes, determined by beliefs about positive and negative consequences of performing the target behavior; (b) perceived expectations of peers, significant other individuals, and institutions (subjective norms); and (c) perceived self-efficacy. The goal of Project RESPECT was to increase the likelihood that a male condom would always be used for vaginal sex with main and casual partners. Activities were designed to improve perceived self-efficacy toward condom use, to encourage positive attitudes towards always using condoms, and to set expectations that condom use is normative among partners and friends/acquaintances. For example, facilitators were encouraged to reward participants for any reported condom use. Facilitators also had participants identify specific friends who were likely to endorse condom use. Preprinted cards with statements advocating the use of condoms were used by facilitators to try to change negative outcome beliefs and strengthen existing positive beliefs about the benefits of condom use. The set of IM variables influenced by these activities was anticipated to be associated with condom use. Structural equation modeling with latent variables (Bentler, 2006) was used to examine associations that existed at the time of recruitment as well as those that followed the delivery of the intervention, and whether the components were differentially associated with different intervention conditions.

The context of the sexual encounter was expected to influence the relative importance of the IM variables associated with condom use. For instance, gender and type of sexual encounter are contextual factors likely to influence condom use dramatically (Chan & Fishbein, 1993; Corby & Wolitski, 1996; Dorfman, Derish, & Cohen, 1992; Hogg, Terry, & White, 1995; Terry, Galligan, & Conway, 1993; Weiss, Weston, & Quirinale, 1993). Women's perceptions of their abilities to influence their partners may be a key factor in condom use. In contrast, men's attitudes toward condom use may be more important than their perceived ability to use them. Given the long history of gender-based theories of social behavior (Gilligan, 1982; Maccoby & Jacklin, 1987), research indicating gender differences in sexual risk acts (Catania et al., 2001; Cubbins & Tanfer, 2000), condom use self-efficacy (Murphy et al., 2001) and the determinants of risk acts (National Institute of Mental Health (NIMH) Multisite HIV Prevention Trial Group, 2002), separate models were examined for males and females.

In addition to gender, the type of sexual partner influences condom use. Two types of partnerships have been identified: main partners (i.e., regular partners, an ongoing partnership) and casual partners. Examples abound of subgroups who have reported using condoms with casual partners, but not main partners: sex workers (Corby, Wolitski, Thornton-Johnson, & Tanner, 1991; McKeganey, 1994), adolescents (Sonenstein, Pleck, & Ku, 1989), gay men (Catania, Coates, & Kegeles, 1994), and heterosexuals (Anderson, Wilson, Doll, Jones, & Barker, 1999; Seage et al., 2002). Given the consistency with which these differences are observed, we examined separately how IM components predicted condom use for men and women with both main and casual partners.

Methods

A detailed description of subject selection and intervention procedures followed in the Project RESPECT randomized clinical trial appears elsewhere (Kamb et al., 1998a; Kamb et al., 1998b). In the present study, data from a subset of RESPECT subjects assigned to the Enhanced Counseling (n = 1,438), Brief Counseling, (n = 1,447), and Didactic Message (n = 1,443) conditions were analyzed. The fourth condition, a Hawthorne condition (n = 1430), was identical to the Didactic condition but did not include follow-up interviews of participants.

Sub-sample Selection and Model Development

Because our outcome measure was reported condom use for vaginal sex in the past 3 months, assessed at 3 months following delivery of the intervention, we restricted our sample to individuals who had engaged in vaginal intercourse during that period of time. (Although abstinence is certainly a form of safe behavior, and may in some instances reflect the non-availability of condoms rather than lack of opportunity for sex, we defined our outcome more narrowly in order to focus on the particular behavior that was the explicit focus of the RESPECT intervention.) The IM was tested between baseline and 3-month follow-up and between immediate follow-up and 3-month follow-up in separate models for those participants who reported casual partners, and for those who had main partners exclusively. To avoid using the same participants twice in assessing behaviors among those with main partners and those who reported casual partners, we divided the samples into participants who reported having sexual relations with casual partners (and possibly but not necessarily with main partners) at initial and follow-up assessments, and those who reported only main partners at both assessments. The baseline to 3-month longitudinal analysis samples and the immediate follow-up to 3-month longitudinal analysis samples primarily consist of the same people. Sample sizes vary slightly depending on survey participation rates and survey items presented to the participants and are reported below in the individual analyses.

We divided the main partner sample by gender. Preliminary multisample comparisons with appropriate invariance constraints indicated similar factor structures for the males and females with casual partners, so we combined the male and female samples for the casual partner analysis at both baseline and immediate follow-up. Sample sizes for the females with casual partners were too small to have separate analyses. There were thus six principal analyses: three analyses used baseline and 3-month outcome data (men with main partners, women with main partners, and men and women with casual partners), and the other three analyses used the immediate follow-up and 3-month outcome data in similar configurations. In the analyses using the baseline data as predictors, 3-month condom use was predicted by elements of the theoretical model and directly by the type of intervention the participant had experienced. In the analyses using immediate follow-up data, intervention status was used as a predictor of the targeted constructs of the IM which in turn were used as predictors of the outcome, 3-month condom use. The impact of the intervention on elements of the IM could thus be assessed. Indirect effects of the intervention on the outcome could also be evaluated.

Measures

The latent variables were primarily based on responses to multi-item scales presented at baseline and again during the immediate follow-up to the intervention. These scales were hypothesized and designed a priori to reflect and represent the major constructs of the IM. In some cases, to reduce the number of measured indicators (Bentler & Wu, 1995; Little, Cunningham, Shahar, & Widaman, 2002), scales with numerous items were factor analyzed using maximum likelihood estimation and the items were subsequently combined into meaningful composites or parcels.

Self-efficacy Beliefs

This construct was represented by five indicators of how certain participants were that they could use condoms (men) or that they could get their partners to

use condoms (women) under different conditions. Items ranged from 0 to 10 and included: (1) the mean of two items that assessed whether the participant could use or get a partner to use a condom when the partner was high on drugs or alcohol, and whether the participant could use or get a partner to use a condom if the participant was drinking or using drugs; (2) the mean of two items concerning condom use when the partner was sexually excited, and when the participant was sexually excited; plus individual items measuring (3) when the partner did not feel like using a condom; (4) how sure the participant was he or she could avoid having sex if no condom was available; and (5) when any difficulty arose.

Positive Behavioral Beliefs

This construct asked respondents to indicate the strength of their beliefs that always using a condom would lead to positive consequences on a five-point (strongly disagree to strongly agree) scale. Items included: (1) the mean of two items concerning protection of self from AIDS, and protection of partner from AIDS; (2) the mean of two items concerning protection of self from STDs, and protection of partner from STDs; (3) the mean of three items concerning responsibility, feeling good, and less worry; (4) a single item, ''it would make you feel cleaner;'' and (5) a single item, ''it would show your partner that you care.''

Negative Behavioral Beliefs

This construct contained beliefs about negative outcomes that were reverse-scored so that all items in the structural equation analysis were scored in the same, positive direction. The five indicators included: (1) the mean of three items concerning beliefs that always using condoms would anger the partner, make the partner suspicious, and make the partner think he or she was not trusted; (2) one item stating that condom use is a lot of trouble; (3) the mean of two items about condom use decreasing sexual pleasure for oneself or one's partner; (4) one item, ''sex would be painful or uncomfortable''; and (5) the mean of two items about condom use ruining the mood and reducing intimacy.

General Normative Beliefs

This construct was indicated by five items scaled 1 to 5 that asked whether friends, family, doctors, their church or religion, and the health department thought the client should (or should not) always use a condom for vaginal sex with a regular (or occasional) partner.

Partner Normative Beliefs

This construct consisted of one item scaled 1 to 5 that asked if the partner felt the client should or should not use a condom for every occasion of vaginal sex.

Behavioral Attitude

This construct was represented by seven bipolar paired items (scaled 1–7). Men evaluated ''my always using a condom''; women evaluated ''my getting my partner to always use a condom.'' The evaluative pairs included: pleasant/unpleasant; wise/unwise; good/bad; difficult/easy; necessary/unnecessary; comfortable/uncomfortable; like/dislike.

Subjective Social Norm

Represented by one item (scaled 1–7), the subjective norm evaluated whether respondents believed their important others thought they should always use or get their partners to always use a condom when they had vaginal sex.

Intention to Use Condoms

The intention to use condoms in the next 6 months was a single item, scored from very unlikely (1) to very likely (7), assessing how likely it was that participants would always use condoms with their partners.

Condom Use

At 3-month follow-up, condom use was measured using three items. One item was based on condom use frequency in the past 30 days on a scale ranging from never (0) to always (4). The second item was a yes/no (0–1) question that asked if a condom was used with their main or casual partner the last time the participant had vaginal sex. The third variable measured condom use percentage in the past 3 months.

Intervention Group Randomization Assignment

The three intervention groups (Enhanced Counseling, Brief Counseling, and Didactic) were represented in the samples. Enhanced Counseling and Brief Counseling were non-orthogonal dummy variables coded 0 or 1, with 1 indicating membership in that particular intervention group (Aiken, Stein, & Bentler, 1994). Randomization assignments to Enhanced Counseling and Brief Counseling were used as predictors in each model. The Didactic group was used as the referent

(Control group). The participants in that group were coded 0 for both intervention group dummy variables.

Analyses

The plausibility of the IM was assessed with latent variable analyses using the EQS structural equation modeling (SEM) program (Bentler, 2006). Such models are useful where multiple indicators can be used to describe various aspects of a theoretical phenomenon (Bentler & Stein, 1992). Covariance structure analysis compares a proposed hypothetical model with a set of actual data; the closeness of the hypothetical model to the empirical data is evaluated statistically through various goodness-of-fit indexes. We report chi-square values for an estimator that is appropriate when the data are multivariately kurtose, the Satorra-Bentler robust chi-square statistic (S-B χ^2; Bentler & Dudgeon, 1996). In addition, we use an index of fit which ranges from 0 to 1, the Robust Comparative Fit Index (RCFI; Bentler & Dudgeon, 1996). Values approaching 0.95 and higher are desirable and indicate that 95% or more of the covariation in the data can be reproduced by the hypothesized model (Hu & Bentler, 1999). Because the data sets were large and chi-square values would also be large (Marsh, Balla, & McDonald, 1988), we also report the root mean square error of approximation (RMSEA) for each model (Steiger, 1990). The RMSEA is a measure of fit per degrees of freedom, controlling for sample size, and values less than .06 indicate a close fitting model (Hu & Bentler, 1999).

Models

Preliminary Confirmatory Factor Analyses

Initial confirmatory factor analyses (CFA) were performed with each hypothesized latent construct predicting its manifest indicators and all latent constructs correlating freely without imputing causality or directionality among them. Intervention condition variables were not included in these preliminary analyses. To improve the fit of the models, a few additional correlated error residuals were added to the models based on suggestions from the Lagrange Multiplier Test (LMT) if they appeared reasonable (Chou and Bentler, 1990).

Because the size of both female samples with casual sex partners (baseline, $N = 207$; follow-up, $N = 180$) was rather small for the full structural models that included the intervention condition, we performed multisample analyses assessing whether the factor structures of the men and women with casual partners were reasonably invariant and equivalent (Hoyle & Smith, 1994). If so, we could assume that they responded to the instrument in the same manner and could be combined for further analyses (Bentler, 2006; Byrne, 1994). The factor loading of each measured variable on its latent factor was constrained to equality across the groups after a baseline chi-square value was obtained for comparison. The plausibility of the equality constraints was determined with a chi-square difference test between the baseline and constrained models. As reported above, the factor structures were invariant across the gender groups and they were thus combined for the latent variable path models.

Path Models

We then tested latent variable path models based on the theoretical behavioral model; consistent with expectations, the latent variables representing positive and negative behavioral beliefs predicted behavioral attitude, and societal and partner normative beliefs predicted subjective norm. Interestingly, the latent variable of self-efficacy also predicted the behavioral attitude. Although not a predicted path in the IM, this finding is consistent with social cognitive theory's assumption that self-efficacy can influence outcome expectancies (see, e.g., Bandura, 1997). It is plausible that similar findings would have been observed had we assumed association rather than causality between self-efficacy and behavioral attitude; such findings would also be consistent with the IM.

In turn, and again consistent with the IM, attitudes, subjective norm, and self-efficacy predicted intention to use condoms, and intention was a strong predictor of actual condom use. In addition, in the baseline to 3-month condom use models, randomization to Enhanced Counseling or Brief Counseling was used as a direct predictor of condom use to determine differential impact of the interventions on the condom use latent variable. It was assumed that the intervention condition did not correlate with any of the baseline variables assessed before the interventions were implemented due to the careful randomization procedures that were followed. For the follow-up to 3-month condom use models, intervention group membership status was included as a predictor of the IM constructs. We thus could evaluate how the intervention condition operated on the belief system and ultimately influenced condom use through mediated indirect effects.

We also used multisample analyses to test if there were any differences in the factor structure immediately after the intervention, and whether the factor means were significantly larger after the intervention. Our hypothesis was that structure (i.e., fundamental relations among the indicators) would not change post-intervention, but that there would be an immediate effect on levels which could be tested by latent means analyses. We contrasted the men with main partners, women with main partners, and men and women with casual partners at baseline and immediate follow-up.

Results

Demographic Characteristics

Demographic characteristics of the sample have been reported in detail elsewhere (Kamb et al., 1998a). To summarize, 57% were male, 71% reported a previous HIV test, 63% reported a previous STD, and 31% had a current STD at enrollment. Fourteen percent reported ever having a sex partner who injected drugs, one percent reported ever having a known HIV-positive partner, and 47% reported a new sex partner in the preceding 3 months. Seventy-six percent of the men and 89% of the women reported having a primary partner, while 60% of the men and 38% of the women reported having at least one non-primary partner. Thirty-eight percent of the sample reported no condom-protected vaginal sex acts in the preceding 3 months. Kamb et al. (1998a) reported participants in the three intervention arms to be highly similar on all baseline characteristics, including condom use.

Confirmatory Factor Analyses

Table 1 presents the means, standard deviations, and factor loadings of the measured variables in the preliminary CFA models for the six groups used in the analyses. The initial fit statistics for the CFA models all approached acceptable levels for goodness-of-fit. Based on suggestions from the LMT we added five covariances between error residuals in each model to improve model fit. The same correlated error residuals were suggested by the LMT for each separate group and were used for each model. These supplementary relationships appear to be reasonable and do not appear to capitalize on chance relationships in the data, particularly because they were suggested by the LMT in each group individually and were the same across the groups. The added correlated error residuals were between the following variables: (1) AIDS protection and STD protection, (2) opinion of doctors and opinion of health department, (3) wise and good, (4) pleasant and comfortable, and (5) necessary and wise. Fit indexes are reported in Table 2.

Baseline and Immediate Follow-up Comparisons

As previously hypothesized, we found an invariant factor structure for the men and women with main partners at baseline and at immediate follow-up (χ^2-difference for men = 27.96, $df = 30$, *ns*; χ^2-difference for women = 41.84, $df = 30$, *ns*). The factor structure for those with casual partners was not factorially invariant although only one constraint needed to be released to obtain a non-significant chi-square difference (χ^2-difference before releasing one constraint = 46.79, $df = 30$, whereas the critical value at $\alpha = 0.05$ is 43.77). When we released one untenable equality constraint as reported by the LMT, the structure was invariant across the groups (χ^2-difference = 29.55, $df = 29$).

When we compared factor means of the IM constructs before and after the intervention (including the single-item variables which were tested as if they were latent variables), we found that in almost all cases the factor means were significantly larger after the intervention. Table 3 reports the z-scores and significance levels of the mean differences pre- and post-intervention.

Path Models

Baseline to 3-month Follow-up Models

The IM was tested with the addition of Enhanced Counseling or Brief Counseling membership as further direct predictors of the outcome of condom use at 3 months. No model modification or model trimming was allowed at this point as we were testing the specified theoretical behavioral model. As depicted in Figures 1, 2, and 3, Enhanced Counseling membership had a significant effect on use of condoms at the 3-month follow-up for all groups. For men with main partners, Brief Counseling also exerted a significant effect on the outcome ($P < .05$).

Immediate Follow-up to 3-month Condom Use Models

The immediate follow-up model included the intervention condition as a possible predictor of all of the IM latent variables regarding beliefs which were assessed after the interventions. We wished to discern how the intervention ultimately exerted its effect on

Table 1 Means, standard deviations, and factor loadings[a] of measured variables in the confirmatory factor analysis

Factor and measured condom use variables	Main partner (Women)				Main partner (Men)				Casual partners (Men + Women)			
	Baseline (n = 683)		Immediate Follow-up (n = 660)		Baseline (n = 551)		Immediate Follow-up (n = 678)		Baseline (n = 556)		Immediate Follow-up (n = 510)	
	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading
I. Self-efficacy beliefs												
Use when self/partner high on drugs (2 items)	5.7 (4.0)	.50	6.6 (3.7)	.62	6.5 (3.8)	.48	6.9 (3.6)	.51	7.1 (3.2)	.53	7.6 (2.9)	.54
Use when self/partner excited (2 items)	6.7 (3.4)	.86	7.7 (3.0)	.86	6.6 (3.4)	.84	7.6 (2.9)	.90	7.4 (2.9)	.82	8.0 (2.4)	.85
Use when partner doesn't want condom	6.2 (3.7)	.81	7.1 (3.4)	.85	5.9 (3.7)	.76	7.0 (3.3)	.81	7.0 (3.3)	.77	7.7 (2.9)	.79
When condom not available, not have sex	5.8 (3.9)	.63	6.9 (3.4)	.65	5.6 (3.8)	.64	6.6 (3.6)	.70	6.6 (3.5)	.63	7.4 (3.1)	.71
Use when any kind of difficulty arises	5.3 (1.9)	.75	5.9 (1.6)	.77	5.3 (1.9)	.62	5.8 (1.5)	.74	5.9 (1.5)	.61	6.2 (1.2)	.71
II. Positive behavioral beliefs												
AIDS Protection, self/partner (2 items)	4.3 (0.9)	.71	4.5 (0.8)	.61	4.1 (1.1)	.60	4.4 (0.9)	.58	4.5 (0.7)	.45	4.6 (0.6)	.84
STD Protection, self/partner (2 items)	4.5 (0.8)	.68	4.6 (0.7)	.61	4.3 (0.9)	.54	4.5 (0.8)	.59	4.5 (0.7)	.51	4.6 (0.6)	.84
Responsible, feel good, worry less (3 items)	4.4 (0.7)	.72	4.5 (0.7)	.82	4.1 (0.8)	.82	4.3 (0.8)	.86	4.5 (0.6)	.77	4.6 (0.5)	.50
Feel cleaner	4.1 (1.1)	.59	4.3 (1.1)	.61	3.7 (1.3)	.66	3.9 (1.2)	.69	4.4 (0.9)	.67	4.4 (0.8)	.30
Show partner that you care	4.2 (1.0)	.64	4.5 (0.8)	.69	4.0 (1.0)	.70	4.2 (1.0)	.72	4.4 (0.8)	.52	4.5 (0.7)	.44
III. Negative behavioral beliefs												
Anger ptr., make self/ptr. suspicious (3 items)	3.1 (1.2)	.62	3.6 (1.2)	.63	3.2 (1.1)	.47	3.5 (1.1)	.55	3.4 (0.9)	.48	3.5 (0.9)	.47
Trouble	3.5 (1.3)	.67	3.8 (1.2)	.71	3.6 (1.2)	.60	3.8 (1.1)	.70	3.7 (1.1)	.64	3.8 (1.0)	.65
Decrease pleasure, self/partner (2 items)	3.2 (1.1)	.68	3.6 (1.1)	.77	3.0 (1.1)	.66	3.3 (1.1)	.78	3.2 (1.1)	.75	3.4 (1.1)	.76
Painful, self	3.7 (1.2)	.39	4.0 (1.1)	.56	3.6 (1.2)	.56	4.0 (1.0)	.67	3.8 (1.2)	.61	3.9 (1.1)	.65
Less intimate, ruin mood (2 items)	3.4 (1.1)	.71	3.8 (1.0)	.79	3.2 (1.1)	.78	3.5 (1.1)	.85	3.5 (1.1)	.81	3.6 (1.0)	.78
IV. General normative beliefs												
Friends	3.9 (1.0)	.67	4.0 (0.9)	.61	3.6 (1.0)	.64	3.8 (0.9)	.72	4.3 (0.8)	.28	4.3 (0.7)	.43
Family	4.3 (0.9)	.77	4.4 (0.8)	.73	4.1 (1.0)	.78	4.2 (0.9)	.83	4.6 (0.7)	.50	4.6 (0.6)	.72
Doctors	4.7 (0.6)	.65	4.7 (0.5)	.70	4.6 (0.8)	.62	4.7 (0.6)	.63	4.8 (0.4)	.86	4.8 (0.4)	.75
Health department	4.8 (0.5)	.50	4.8 (0.4)	.62	4.8 (0.6)	.52	4.8 (0.5)	.49	4.9 (0.3)	.77	4.8 (0.4)	.64
Church or religion	4.3 (0.9)	.48	4.3 (0.9)	.53	4.1 (1.0)	.48	4.2 (1.0)	.47	4.6 (0.8)	.33	4.5 (0.9)	.39
V. Partner normative beliefs												
Expectation for condom use with him/her	2.9 (1.2)	–	3.1 (1.3)	–	3.1 (1.2)		3.4 (1.2)	–	3.5 (1.0)	–	3.6 (1.0)	–
VI. Behavioral attitude												
Pleasant	4.6 (2.2)	.72	5.5 (1.7)	.77	4.0 (2.1)	.69	5.0 (1.8)	.82	5.1 (2.0)	.78	5.5 (1.7)	.83
Wise	6.3 (1.4)	.65	6.6 (1.1)	.74	6.1 (1.5)	.60	6.3 (1.3)	.63	6.7 (0.9)	.48	6.8 (0.8)	.42

Table 1 continued

Factor and measured condom use variables	Main partner (Women) Baseline (n = 683)		Main partner (Women) Immediate Follow-up (n = 660)		Main partner (Men) Baseline (n = 551)		Main partner (Men) Immediate Follow-up (n = 678)		Casual partners (Men + Women) Baseline (n = 556)		Casual partners (Men + Women) Immediate Follow-up (n = 510)	
	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading	Mean (SD)	Loading
Good	6.5 (1.2)	.77	6.5 (1.2)	.77	5.6 (2.1)	.71	6.1 (1.4)	.74	6.4 (1.3)	.61	6.6 (1.1)	.58
Easy	4.9 (2.2)	.60	5.6 (1.8)	.61	5.0 (2.1)	.64	5.5 (1.8)	.75	5.6 (1.9)	.70	5.9 (1.5)	.74
Necessary	5.7 (1.9)	.65	6.3 (1.5)	.74	5.4 (2.1)	.68	5.9 (1.7)	.72	6.6 (1.1)	.53	6.8 (0.7)	.35
Comfortable	4.7 (2.2)	.70	5.5 (1.8)	.70	4.0 (2.2)	.68	4.8 (1.9)	.81	5.1 (2.0)	.75	5.5 (1.7)	.81
Like	5.1 (2.1)	.66	5.8 (1.6)	.76	3.6 (2.2)	.73	4.5 (2.1)	.79	5.3 (2.2)	.68	5.8 (1.7)	.68
VII. Subjective social norm												
Most people important to you	5.8 (1.8)	–	6.3 (1.4)	–	5.4 (2.0)	–	5.8 (1.7)	–	6.5 (1.1)	–	6.6 (0.9)	–
VIII. Intention to use condoms												
Next 6 months	4.7 (2.4)	–	5.7 (1.9)	–	4.4 (2.5)	–	5.4 (2.1)	–	6.2 (1.5)	–	6.5 (1.1)	–
IX. Condom use (3-month follow-up)												
Frequency used past 30 days	2.1 (1.8)	.99	2.2 (1.8)	.99	1.9 (1.8)	.99	1.9 (1.8)	.99	2.8 (1.7)	.96	2.8 (1.7)	.96
% used last time, vaginal sex	47 (0.5)	.89	49 (0.5)	.88	43 (0.5)	.88	42 (0.5)	.88	72 (0.5)	.88	72 (0.5)	.89
% times used condom, vaginal sex, 3 months	53 (0.4)	.95	56 (0.4)	.94	48 (0.4)	.96	49 (0.4)	.97	74 (0.4)	.94	75 (0.4)	.92

[a] All factor loadings significant, $P \le .001$

the outcome variables and upon which beliefs the intervention had its greatest impact. Therefore, non-significant paths from the two intervention conditions to the belief variables were gradually deleted until only significant paths remained. We then were able to determine the significant indirect effects of intervention condition mediated through the belief variables on the intermediate and outcome variables. Figures 4, 5, and 6 depict the results. Relations among the baseline IM latent variables are not depicted for readability, but they are similar to those reported in Figures 1, 2, and 3.

For the males with main partners, Enhanced Counseling significantly enhanced positive and negative behavioral beliefs, as well as self-efficacy beliefs. Enhanced Counseling also had a significant indirect effect on behavioral attitude ($P < .001$), intention to use a condom ($P < .001$), and condom use ($P < .001$). For the females with main partners, both interventions significantly enhanced negative behavioral beliefs and self-efficacy (Enhanced Counseling, $P < .001$; Brief Counseling, $P < .05$). Both Enhanced Counseling and Brief Counseling had significant indirect effects on behavioral attitude, intention to use condoms, and condom use ($P < .001$ and $P < .05$, respectively).

For the men and women with casual partners, both Enhanced Counseling and Brief Counseling significantly influenced self-efficacy. In addition, Enhanced Counseling significantly influenced negative behavioral beliefs, and both counseling conditions indirectly predicted behavioral attitude, intention, and condom use ($P < .001$). We also found a counter-intuitive negative relationship between Enhanced Counseling membership and normative beliefs for the men and women with casual partners. Although group membership had been assigned randomly, further examination indicated this relationship arose due to an even larger pre-existing negative relationship between Enhanced Counseling membership and normative beliefs at baseline. However, no other pre-existing relationships were significant. Therefore, in general, randomization was quite successful; however, this one pre-existing, significant relationship could not be fully eliminated at follow-up. On the basis of chance, one might expect that one or more relationships would be significant either positively or negatively before implementation of the interventions. Goodness-of-fit statistics of the path models are reported in the figures.

Condom Use Item Means by Intervention Condition

Means for the individual items comprising the composite indicator of condom use are shown in Table 4 for each intervention condition for the three immediate

Table 2 Fit indexes for baseline and immediate follow-up models

Model	Satorra-Bentler χ^2 (d.f., N)	Robust Comparative Fit Index	Root mean square error of approximation
Baseline			
Men, main partners	997.50 (457, N = 551)	.93	.046
Women, main partners	1367.34 (457, N = 683)	.91	.054
Men + women, casual partners	899.09 (457, N = 556)	.93	.042
Immediate follow-up			
Men, main partners	1147.95 (457, N = 678)	.94	.047
Women, main partners	1221.50 (457, N = 660)	.90	.050
Men + women, casual partners	796.77 (457, N = 510)	.93	.038

Table 3 Differences between means of latent variables measured at baseline and immediate follow-up

Latent variables	z-scores		
	Main partner (Males)	Main partner (Females)	Casual partners (Males + Females)
Self-efficacy beliefs	5.98[c]	6.23[c]	4.65[c]
Positive behavioral beliefs	3.99[c]	4.69[c]	2.27[a]
Negative behavioral beliefs	6.00[c]	7.60[c]	2.75[b]
General normative beliefs	2.92[c]	2.77[b]	–0.65
Partner normative beliefs	4.62[c]	3.54[c]	2.06[a]
Behavioral attitude	7.46[c]	8.78[c]	3.72[c]
Subjective social norm	3.85[c]	5.18[c]	2.04[a]
Intention to use condom	7.20[c]	8.63[c]	2.84[b]

Note: Significance levels based on 1-tailed tests. [a]$P < .05$; [b]$P < .01$; [c]$P < .001$. Positive z-scores indicate higher means at follow-up

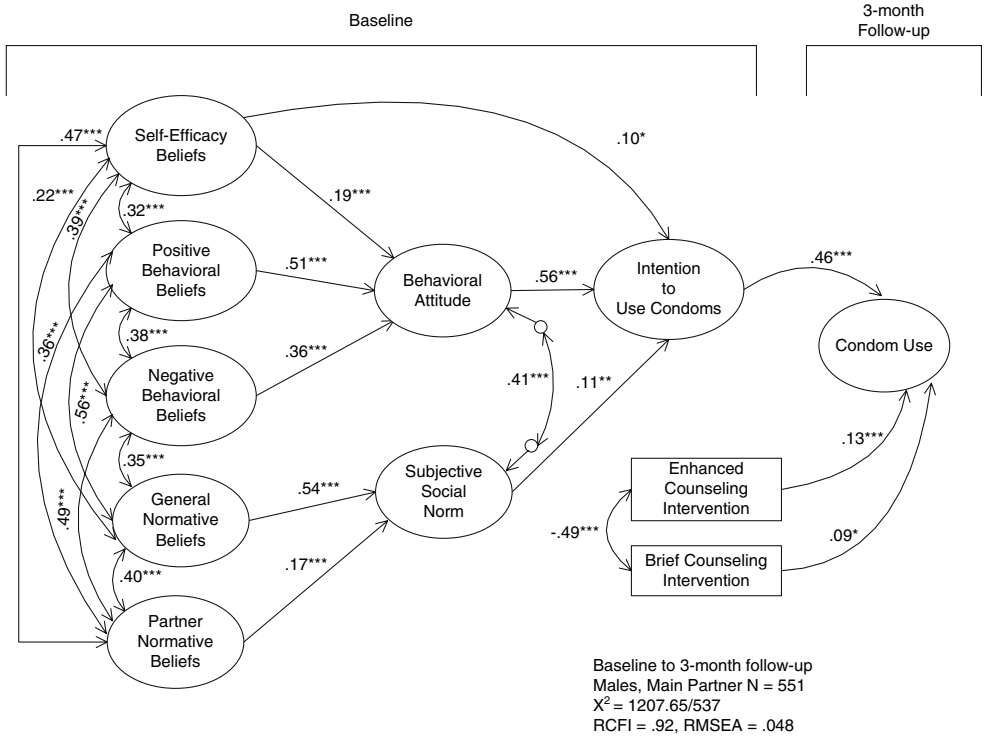

Fig. 1 Baseline to 3-month condom use path model for men with main partners. Intervention condition positioned as direct predictor of condom use. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Regression coefficients and covariances are standardized. (*$P < .05$, **$P < .01$, ***$P < .001$)

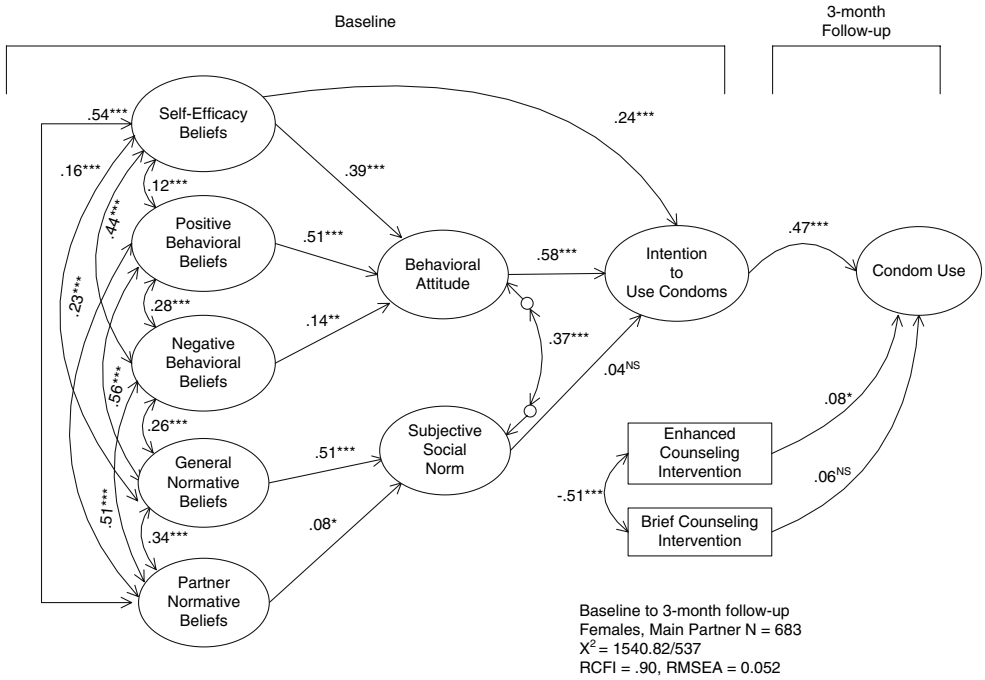

Fig. 2 Baseline to 3-month condom use path model for women with main partners. Intervention condition positioned as direct predictor of condom use. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Regression coefficients and covariances are standardized. (*$P < .05$, **$P < .01$, ***$P < .001$)

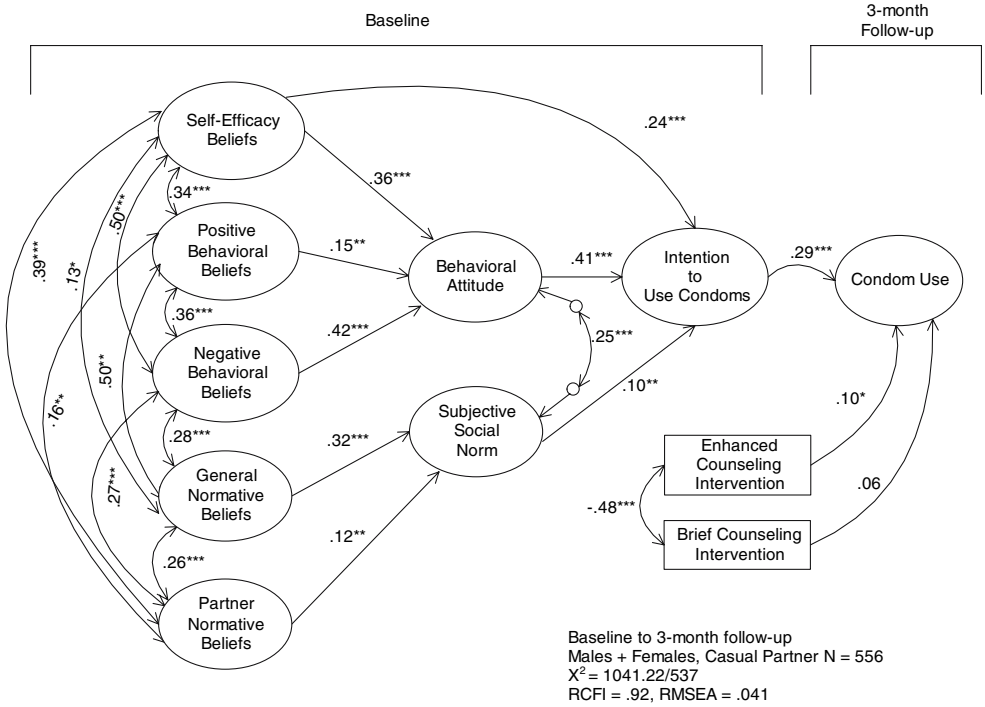

Fig. 3 Baseline to 3-month condom use path model for men and women with casual partners. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Intervention condition positioned as direct predictor of condom use. Regression coefficients and covariances are standardized. (*$P < .05$, **$P < .01$, ***$P < .001$)

follow-up analysis groups: men with main partners (Fig. 4), women with main partners (Fig. 5), and men and women with casual partners (Fig. 6). These data reflect condom use reported 3 months post-baseline among those individuals for whom cognitive predictor measures were obtained immediately following intervention participation. There were consistent differences across the three measures of condom use in favor of the Enhanced and Brief Counseling interventions versus the Control group and, with one exception, in favor of the Enhanced versus the Brief intervention. Differences between the Enhanced and

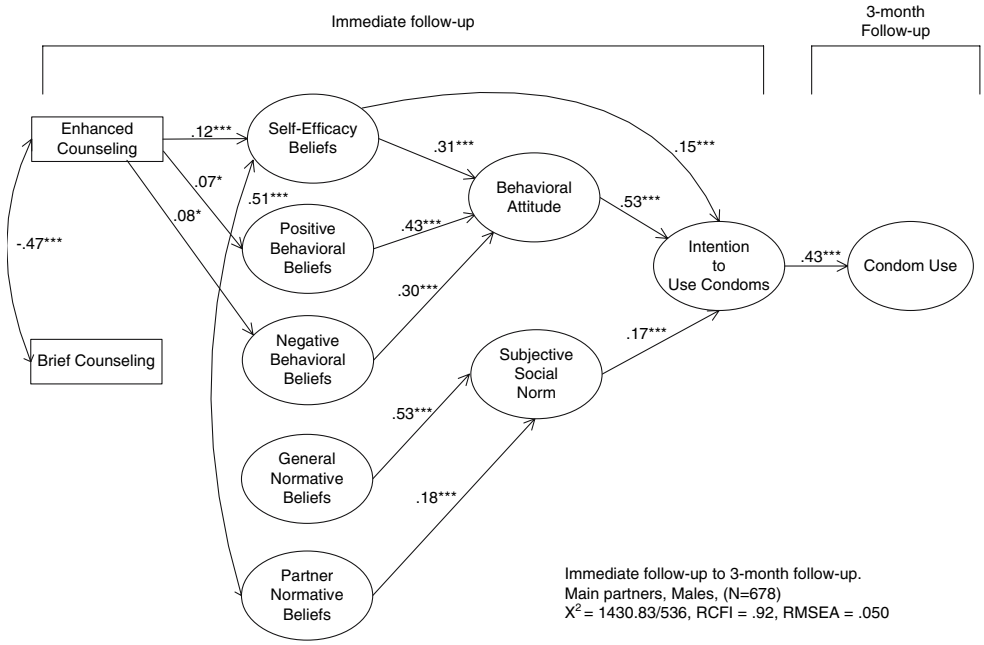

Fig. 4 Immediate follow-up path model predicting 3-month condom use for men with main partners. Intervention condition positioned as predictor of beliefs. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Regression coefficients and covariances are standardized. Relations among IM beliefs variables not depicted for readability. (*$P < .05$, **$P < .01$, ***$P < .001$)

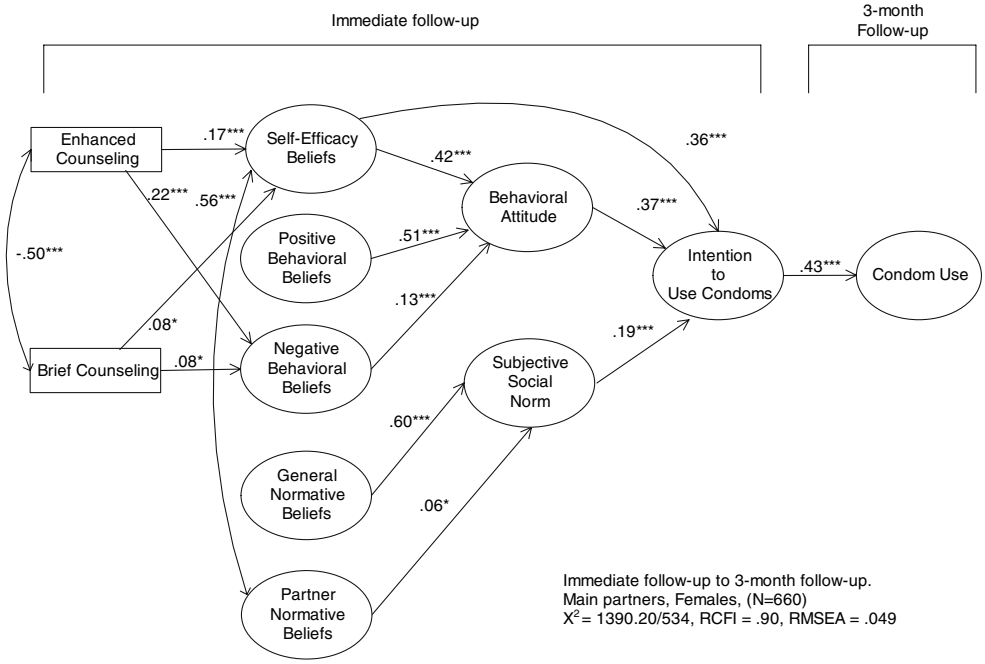

Fig. 5 Immediate follow-up path model predicting 3-month condom use for women with main partners. Intervention condition positioned as predictor of beliefs. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Regression coefficients and covariances are standardized. Relations among IM beliefs variables not depicted for readability. (*$P < .05$, **$P < .01$, ***$P < .001$)

Brief interventions were small for women with main partners, and for men and women with casual partners, but more robust for men with main partners.

Discussion

This study provides a valuable opportunity to examine the utility of the IM as an effective underlying theoretical framework for HIV prevention programs. In collaboration with the CDC, a joint protocol was implemented across five regional sites with a high degree of fidelity. The entry criteria resulted in samples that were similar in risk behaviors, and the randomization process resulted in samples that were similar across intervention conditions. The participants were predominantly African-American (59%) or Latino (16%), groups at the highest risk for HIV infection.

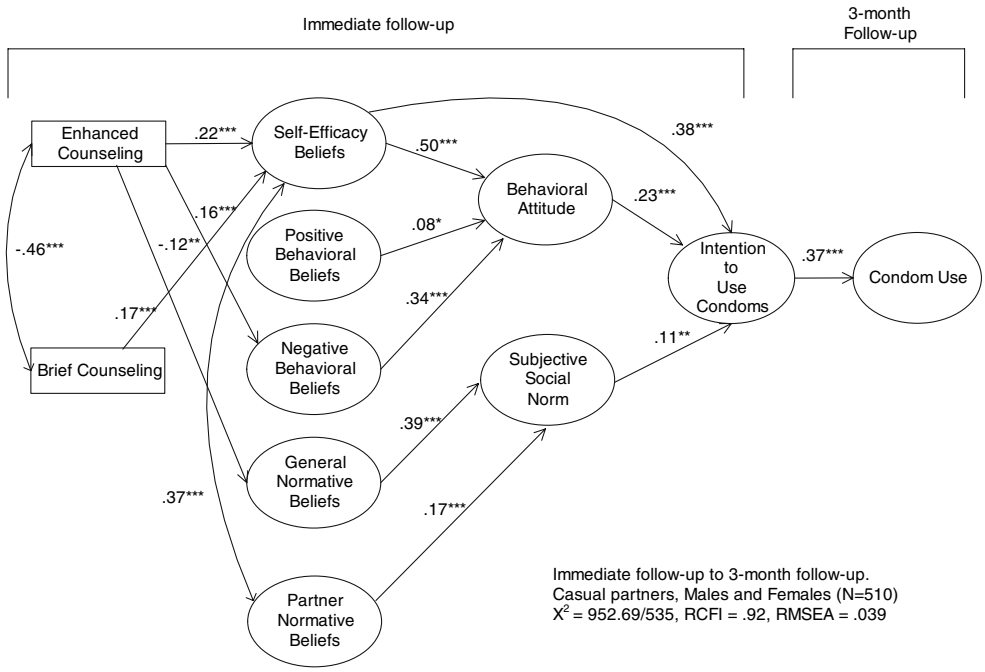

Fig. 6 Immediate follow-up path model predicting 3-month condom use for men and women with casual partners. Intervention condition positioned as predictor of beliefs. Latent constructs in circles, measured variables in rectangles, 2-headed arrows indicate covariances, 1-headed arrows are regression paths. Regression coefficients and covariances are standardized. Relations among IM beliefs variables not depicted for readability. (*$P < .05$, **$P < .01$, ***$P < .001$)

Table 4 Item means by intervention condition for condom use at 3-month follow-up[a]

Group	Used last 30 days (Rating)	Used last time (% Yes)	Used last 3 mos. (% Times)
Men with main partner			
Control group	1.79	39	46
Enhanced intervention	2.15	49	56
Brief intervention	1.74	39	45
Women with main partner			
Control group	2.01	46	51
Enhanced intervention	2.29	49	60
Brief intervention	2.17	51	56
Men & women with casual partners			
Control group	2.56	67	69
Enhanced intervention	3.01	75	81
Brief intervention	2.94	73	78

[a] Shows individual means for the three items comprising the composite condom use indicator used in all analyses. Reflects post-intervention condom use reported 3 months post-baseline for the immediate follow-up groups (i.e., individuals for whom cognitive predictor measures were obtained immediately following intervention participation)

The follow-up rate was high and there was a high degree of internal validity at each point in the study. However, only 44% of eligible individuals elected to participate in the study, raising possible concerns regarding the degree of external validity. Refusers and participants were similar in age, racial/ethnic background, and education, but relatively more study participants were women, had an STD at time of enrollment, and had previously been tested for HIV. Among individuals who completed the intervention, 71% were reassessed at the 3-month time frame.

The components of the IM monitored at the time of recruitment generally predicted condom use 3 months later. Across both main and casual partners, the prediction of condom use intention from behavioral attitude, self-efficacy, and subjective social norms was validated by the structural equation models. In addition, despite the intervening intervention, condom use intention measured at baseline predicted actual condom use 3 months later. Overall, this represents strong support for the IM.

Depending on participants' gender and type of partner, different components of the IM were relatively more or less important as determinants of condom use intentions. For main sexual partners, different components of the IM were associated with condom use intentions for men versus women. More specifically, although attitudes were the primary

determinants of intentions for both men and women, the relative importance of self-efficacy was much greater for women than it was for men. This is consistent with previous data on gender differences in sexual behavior, which suggest that issues of perceived personal power and control are especially salient for women seeking to have their male partners use condoms (Amaro & Raj, 2000). Finally it is worth noting that while perceived norms had a small but significant influence on men's intentions to use condoms with their main partners, consistent with Sheeran, Abraham, and Orbell (1999), they had little influence on women's condom use intentions vis-à-vis their main partners.

Primarily because of the sample size, we were not able to examine gender-specific predictors of the IM framework for condom use with casual partners. In general, for men and women with casual partners, attitude was again the primary determinant of condom use intentions, with self-efficacy also important. Once again, although normative influences were also significant, they played a relatively minor role as independent determinants of the intention to use condoms with a casual partner. Taken together, these data suggest that prevention programs should be tailored to emphasize different components of the IM for different subgroups of participants representing different combinations of gender and type of sexual partner. More specifically, while attitudes should always be targeted, it would appear that self-efficacy should also be addressed when intervening with women, and perhaps with men with respect to condom use with casual partners. It would appear that little will be accomplished by focusing on subjective norms.

Note, however, that there was a shift following the intervention in the relative importance of attitudes, subjective norms, and self-efficacy. In particular, the strength of the associations between subjective norms and condom use intention increased from baseline to follow-up for both men and women with main partners, and the association between self-efficacy and intention increased for both genders with respect to casual partners. By contrast, the associations between behavioral attitude and condom use intention weakened for women with main partners and for both genders with casual partners. Both the Enhanced Counseling and Brief Counseling interventions focused on modifying specific components of behavioral attitude and self-efficacy, while the Enhanced intervention additionally sought to modify subjective social norms.

In sum, the first set of analyses not only provided strong support for the Integrative Model, but more important, provided strong evidence that the Enhanced intervention significantly influenced condom use for both men and women with respect to both main and casual partners over and above their baseline intentions to use condoms. In contrast, the Brief Counseling intervention only influenced men's condom use with their main partners. The second set of analyses provides insight into these findings. More specifically, these analyses indicated that while Enhanced Counseling appears to have systematically changed self-efficacy and negative behavioral beliefs for both men and women with respect to both main and casual partners, and to have also influenced normative beliefs for both men and women with respect to casual partners, Brief Counseling's influence on these determinants of condom use was relatively weak and inconsistent. Our data indicate that interventions can influence the relative importance of the three major determinants of intention, which may help explain why Brief Counseling also had a small but significant effect on men's condom use behavior with their main partners.

Although this study goes further than others in discerning more finely how interventions influence intentions and behavior, future evaluations must examine how the various components of an intervention modify the theoretical components believed to underlie behavior change. For example, although the four-session Enhanced Counseling intervention was designed specifically to improve subjective social norms, self-efficacy, and behavioral attitude (and thus intention to use condoms), the intervention activities were not successful in impacting all components as desired. The IM indicates what factors must be changed in order to change HIV-related risk behavior, but how to change these components is not specified by the theory. For those interested in behavior change interventions, this is clearly the next big challenge.

Acknowledgment This paper was supported, in part, by grant DA01070-33 from the National Institute on Drug Abuse and grant P 30 MH 58107 from the National Institute of Mental Health.

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